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UNIONS AND EFFICIENCY IN PRIVATE SECTOR CONSTRUCTION: FURTHER EVIDENCE

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ABSTRACT

Previous studies using micro data to estimate the impact of unions on productivity in construction in the early 1970's have found productivity to be higher for union than nonunion contractors in the private sector. The validity of these studies has been questioned in light of the declining market share of union contractors. This study re-examines union-nonunion productivity differences over a sample of retail stores and shopping centers built in the late 1970's. It finds that square footage put in place per hour is 51 percent greater for union than nonunion contractors.

Lacking data on wage rates by occupation, the impact of unions on efficiency can be gauged only by looking at how unions affect costs, profit rates, and prices. This study finds no mean cost per square foot difference between union and nonunion contractors and offers mixed econometric evidence on translog cost functions. There is no difference in profit rates or prices between union and nonunion contractors in this sample.

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Allen (1986a) estimated the impact of unions on productivity over two samples of construction projects built in the early 1970's.[1] Productivity of union contractors was at least 30 percent greater than productivity of nonunion contractors in commercial office building construction, but there was no difference in the productivity of union and nonunion contractors in school construction.

There are two puzzles which that study left unanswered: (1) why does the impact of unionism on productivity vary across different types of construction and (2) do the results still hold in light of the declining percentage of construction workers belonging to unions? This paper sheds new light on these issues by examining the effect of unions on productivity over a sample of retail stores and shopping centers built in the late 1970's. It also examines a wider range of measures of economic efficiency, including costs, prices, and profits in order to establish the robustness of the results.

BACKGROUND

The contrasting results for different types of construction obtained in Allen (1986a) could be generated by misspecification of the empirical model, heterogeneity in technology or building codes, or differences in the incentives of the owners. To test the first possibility, Allen (1987) estimated translog cost function systems and hedonic price equations and compared mean profit rates for union and nonunion contractors in the office building and school samples. In the cost system specification, where input prices rather than input quantities are exogenous and there are relatively few econometric restrictions, the results were quite comparable to those obtained with production functions. Costs were nearly equal for union and nonunion contractors in the office building sample (actually lower in large buildings for union contractors), indicating that the cost of higher wage rates was offset by greater productivity for union contractors, but costs were higher for union than nonunion contractors in school construction in all size ranges. The price results showed no union-nonunion price difference in office building construction, but higher prices for schools built by union contractors. Profit rates were the same for union and nonunion contractors within each sample. The office building and school results are thus clearly robust across alternative specifications.

This suggests that the differences in union impact between the two samples arise from differences in either technology or ownership. Allen (1986b) tested this by examining the impact of unions on productivity over a sample of public and private non-profit hospitals and nursing homes, all of which were built under the Hill-Burton program. The productivity of union contractors was 23 percent greater than that of nonunion contractors in private hospital construction, but there was no union-nonunion productivity difference in public hospital construction. Further, productivity of union contractors in private hospital construction was 33 percent larger than in public hospital construction. This evidence shows marked differences in union behavior between public and private non-profit construction, despite identical technologies and building codes.

There are still two legitimate questions about union impact on private sector construction which all of these studies leave unanswered. First, the hypothesis of no union-nonunion productivity difference in private hospital construction could only be rejected at the 87 percent confidence level. This means that except for the office building sample, there is no other solid evidence from micro data of higher union productivity in private construction.

Because of the small size of the office building sample (83 structures) and the tremendous diversity in the construction industry, it is natural to question whether those results can be replicated for another sample of micro data.

Second, it is difficult to reconcile the evidence of higher productivity of union contractors and equal unit costs, prices, and profit rates for union and nonunion contractors from the office building sample with the decline in the percentage of construction workers belonging to unions. Allen (1986c) shows that this percentage gradually declined from 46 to 41 percent between 1970 and 1977 and then dropped rapidly to 32 percent by 1983. Most of the work for the projects in the sample studied here was done in 1977, which may give some clues as to whether union contractors still have greater productivity.

DATA

This paper examines a sample of 42 retail stores and shopping centers which opened between October 1976 and March 1978. The sample comes from a survey by the Bureau of Labor Statistics, as part of its Labor and Materials Requirements program. This was the last survey done under that program. A random sample of 75 projects was originally selected from a population stratified by location (four regions) and size (dollar amount). Sample attrition results from projects turning out to be outside the scope of the survey (e.g., most space used for offices or residences, renovation instead of new construction, completion after March 1978) and from lack of contractor cooperation. BLS does not possess any information about the union status of the projects excluded from the sample, so no adjustments for attrition bias can be made.

The general contractor for each project reported the type of construction, the total value of the contract, dates of construction, square footage, and a variety of building characteristics. The general contractor and each subcontractor reported expenditures on materials and equipment as well as hours, earnings, and collective bargaining coverage. Out of the 42 projects used in this study, in 30 cases most labor hours were generated by contractors covered by a labor-management agreement. These will be referred to as union projects below; all other projects will be referred to as nonunion. Complete data on hours and earnings for detailed occupations on each project are not available, making it impossible to construct a labor quality index. This is unlikely to bias the results because in my previous studies such indexes were uncorrelated with productivity and the other coefficients were not sensitive to exclusion of the index from the model.

Two key variables for the cost function analysis had to be imputed from other sources. The price of capital equals the rate of return from the 1977 Census of Construction Industries (CCI) for the state in which the project was located.[2] The price of materials is derived from the 1978 Dodge Manual for Building Construction Pricing and Scheduling. If the Dodge Manual reports a materials price index for the SMSA in which the project was located, that value is used as the price of materials. Otherwise the price of materials equals the statewide employment-weighted mean of the materials price index.[3]

The relative frequency distributions for all of the building characteristics used in the results reported here are reported in Table 1. In most respects the union and nonunion projects are quite similar. The key exceptions to this general tendency are that union projects are more likely to have two or three stories, more likely to have masonry exterior walls, less likely to have a vinyl floor covering, and less likely to have built-up roofs with steel decking than nonunion projects. The net effect of these differences in building characteristics on the results is difficult to predict. Failure to control for such characteristics would tend to favor union contractors in two cases (number of stories and type of roof) and favor nonunion contractors in the other two cases (exterior wall and floor covering).

PRODUCTION FUNCTION RESULTS

As in Allen (1986a,1986b), the production function is assumed to be Cobb-Douglas. Two dependent variables are examined (value added per hour and square footage per hour) in specifications which either contain or omit building characteristics. The building characteristics dummies included in column 4 of Table 2 were selected according to the same criteria as in the earlier studies: their coefficients had to be consistent with the engineering data in 1977 Dodge Construction Systems Costs, some of the coefficients associated with a particular characteristic (e.g. there are three different dummies for frame) had to be greater than their standard error, and the characteristic had to be observed in more than one building. The same characteristics are also used in column 2 to make the value added and square footage results comparable.

Square footage per hour is 51 percent (exp(.414)-1) greater for union than nonunion contractors in store and shopping center construction in the specification where building characteristics are included, but only 8 percent greater when the building characteristics are excluded from the model. The latter estimate is much smaller than its standard error.

Which estimate is to be believed? When no building characteristics are included in the model, the joint null hypothesis for all of the coefficients in the square feet per hour equation cannot be rejected. Not only is productivity no different for union and nonunion projects in this specification, but also productivity is uncorrelated with such conventional variables as capital intensity, scale, and location. This can result only from extreme measurement error, inadequate sample size, or failure to include critical omitted variables. As the results in column 4 indicate, the latter possibility seems most plausible. Once the building characteristics are added to the model, the joint null hypothesis is strongly rejected and the conventional significant correlation between capital intensity and productivity appears. Each of the summary statistics shows that the building characteristics clearly "belong" in the equation.

The value added per hour results replicate the findings of earlier studies by myself and others. With building characteristics excluded, this measure of productivity is 32 percent greater for union than nonunion contractors; the productivity advantage of union contractors widens to 48 percent when the controls for building characteristics are added to the model. Given the well-known problems in interpreting cross section productivity equations using value added as an output measure, these results are not by themselves definitive but they demonstrate the robustness of the square footage per hour findings.

These results imply that the finding in Allen (1986a) of higher union productivity in commercial office building construction in 1972-73 cannot be dismissed because it pertains only to a particular type of construction or to a time period which is now of no more than historical interest. In spite of the small sample size, the results provide further evidence that the behavior of unions in the construction industry varies dramatically between public and private sector projects. Still, productivity is but one indicator of the impact of unions on efficiency and, because detailed information on wages by occupation in each project is not available in this case, it is quite possible that despite higher productivity under unionism, total construction costs or the price of the project might be greater for union contractors because of higher union wages. To get a complete picture, other indicators of efficiency must be examined.

COST COMPARISONS

In addition to testing the robustness of the production function results, cost comparisons also provide the opportunity to replicate the main finding in Allen (1987) -- that economies of scale in union construction allow union contractors to build larger projects at lower costs than nonunion contractors. Summary statistics in Table 3 show that the mean value of cost per square foot is about the same in union and nonunion projects, ignoring differences in project size. Looking across project size categories, costs per square foot are lower for union projects of 100,000 square feet or more than for smaller union projects. Ignoring one nonunion project of 2800 square feet where cost per square foot was almost $54, there is no difference in mean cost per square foot across different size categories for nonunion projects. Within each size category, the hypothesis of no union-nonunion cost difference cannot be rejected.

A more rigorous test of union-nonunion cost differences is to determine whether the coefficients of translog cost functions and share equations vary between union and nonunion contractors. In the single output case, the function is written

$$\ln C = \alpha_0 + \alpha_Y \ln Y + .5\beta_{YY}(\ln Y)^2 + \sum_i \beta_{Yi} \ln Y \ln P_i$$

$$+ \sum_i \alpha_i \ln P_i + .5\sum_i \sum_j \beta_{ij} \ln P_i \ln P_j, \qquad (1)$$

where C = variable cost, Y = output, and P_i = price of variable input i. A three factor specification is used in the results reported below--labor (L), materials (M), and capital (K). Two sets of restrictions from production theory are imposed in all cases: (1) symmetry, which requires that $\beta_{ij} = \beta_{ji}$, and (2) homogeneity of degree one with respect to prices, which requires that

$$\sum_i \alpha_i = 1; \sum_i \beta_{Yi} = 0; \sum_i \beta_{ij} = \sum_j \beta_{ij} = \sum_{ij}\sum \beta_{ij} = 0.$$

Shephard's lemma states that $\partial C/\partial P_i = X_i$. In logarithmic terms, this becomes

$$\partial \ln C/ \partial \ln P_i = p_i X_i/C = S_i,$$

where S_i is the share of factor i in total cost. If the cost function is (1), the share equation for each factor is

$$S_i = \alpha_i + \beta_{Yi} \ln Y + \sum_j \beta_{ij} \ln P_j. \qquad (2)$$

To take advantage of the additional information about the parameters appearing in the share equations, (1) and (2) are jointly estimated below using iterated seemingly unrelated regressions. One share equation must be omitted to prevent the variance-covariance matrix of the error terms in (1) and (2) from being singular. The additional information on factor shares increases degrees of freedom to 80 in the union sample and 26 in the nonunion sample. Iterated seemingly unrelated regression produces maximum likelihood estimates which are invariant to the choice of which share equation is dropped. Six different specifications of these systems of equations were estimated: (1) no restrictions; (2) homotheticity (β_{Yi}=0, all isoquants have the same slope along a ray from the origin); (3) homotheticity and homogeneity of costs with respect to output ($\beta_{Yi}=\beta_{YY}=0$); (4) unitary elasticities of substitution ($\beta_{ij}=0$); (5) unitary elasticities of substitution and homotheticity ($\beta_{ij}=\beta_{Yi}=0$); and (6) unitary elasticities of substitution, homotheticity, and homogeneity ($\beta_{ij}=\beta_{Yi}=\beta_{YY}=0$). In the union sample none of the six sets of restrictions could be rejected with a log likelihood ratio test, but sets 3 and 6 could be rejected for the nonunion sample. This means that meaningful cost comparisons can be made with specifications 1, 2, 4, and 5. As the last column of Table 4 shows, the hypothesis of equal union and nonunion coefficients can be rejected only in specification 5. This makes this case the most logical one for cost comparisons of union and nonunion contractors. The other three contain free parameters which, although estimated with very little precision, could strongly influence the cost comparisons.

It turns out that the cost comparisons produce very different results across these six different specifications. To provide a more complete picture of the results, cost comparisons from specification 1 are also reported in Tables 5 and 6. Table 5 reports the translog coefficients and Table 6 summarizes the key results on cost comparisons and economies of scale.[4] Union (nonunion) means of input prices are used to compute the cost and economies of scale results for union (nonunion) contractors in Table 6. Table 5 also reports the results of estimating the cost function and share equations over the pooled sample in a specification where the intercept of the cost function is allowed to vary by union status. Holding factor prices and output constant, this model shows that costs are 24 percent greater for nonunion contractors. However, the means for factor prices at the bottom of Table 5 show very clearly that the assumption of equal factor prices is untenable. This assumption is removed in the tabulations in Table 6.

The cost comparisons based on specification 5 replicate the results in Allen (1987) for office buildings. Costs increase with output much more rapidly and economies of scale vanish at much smaller output levels for nonunion contractors. Union contractors produce buildings with more than 180,954 square feet at lower cost than nonunion contractors. The model also indicates they produce buildings of less than 16,042 square feet at lower cost than nonunion contractors, but this result is most likely attributable to one small nonunion project. The hypothesis than $\ln C_u - \ln C_n = 0$ is rejected at the 95 percent confidence level for projects below 6,081 and above 477,347 square feet (ranges where union contractors have lower costs) and for projects between 42,319 and 68,597 square feet (a range where nonunion contractors have lower costs). At most observed output levels, union and nonunion contractors compete on equal terms.

When the cost comparisons are based on the least restrictive model, the results for economies of scale are about the same, but nonunion costs tend to be lower than union costs at almost all output levels. A careful comparison of the cost functions in Table 6 and the translog coefficients in Table 5 shows that the main reason for the difference in results is the change in the union cost function. The nonunion cost function is almost identical in the two specifications, whereas the intercept and ln Y terms of the union cost function vary considerably even though the restrictions in specification 5 are not rejected by the data.

What are we to make of the conflicting results in Tables 5 and 6? One view is that the "best" specification shows that the costs of union and nonunion contractors are nearly equal at most output levels, indicating that greater productivity offsets the cost of higher wage rates for union contractors. The other is that the data have delivered a split verdict and that no firm conclusions can be drawn about cost differences between union and nonunion contractors.

PRICE AND PROFIT COMPARISONS

Given the evidence on costs, data on the price of projects and contractor profits must be examined to obtain a complete picture of how unions affect efficiency in store and shopping center construction. If costs are actually higher for union contractors, one would also expect them to have either lower profits, higher prices, or both. If costs are nearly equal on average for union and nonunion contractors, then prices and profits should either be equal or offsetting.

Price comparisons are based on the union coefficient of hedonic price functions in Table 7. In a model where the only other regressors are the square footage of the project and three region dummies, the price of the building is 4 percent higher for union than nonunion contractors. As in Allen (1985), this very simple model explains almost 90 percent of the price variation across the sample. When controls for building characteristics are added to the model, the price of each project turns out to be 1.5 percent lower for union than nonunion contractors. Because neither estimate is significantly different from zero and both coefficients are quite small in absolute value, it seems safe to conclude that there is no price difference between union and nonunion contractors in the sample.

Profit comparisons are difficult to make because employee benefits and off-site costs are not reported. To adjust for employee benefits, profit rates are calculated under two assumptions in Table 8 -- no employee benefits for either union or nonunion contractors and no employee benefits for nonunion contractors only. Employee benefits are imputed for union contractors using the same technique as in Allen (1987). Under the first assumption, profits have a 2.6 percentage point greater share of the project price for union contractors; under the second assumption, a 1.1 percentage point lower share. In neither case can the hypothesis of no profit share difference be rejected. This evidence on profits and prices is consistent with costs being nearly equal for union and nonunion contractors at most ranges of output.

CONCLUSION

This paper has compared productivity for union and nonunion contractors in retail store and shopping center construction in 1977. The most reliable estimates indicate that square footage put in place per hour is 51 percent greater for union than nonunion contractors. Indirect support for this result is also found in the cost, profit, and price comparisons. Taking higher wages for union contractors as given, if productivity is really higher for union than nonunion contractors in the sample, then one would expect to observe no union-nonunion difference in unit costs, profit rates, and prices. This study finds no mean cost difference between union and nonunion contractors and offers mixed econometric evidence on cost functions. There is no difference in profit rates or prices between union and nonunion contractors in this sample. On balance, both the direct evidence on productivity and the indirect inferences about productivity obtained from studying costs, profits, and prices point to the same conclusion -- despite a moderate decline in market share, the productivity of union contractors in retail construction in the late 1970's was much greater than that of nonunion contractors. Whether this is still true today, after a more rapid decline in market share, is an open question which cannot be answered with available data.

Viewing these results along with earlier findings based on public (schools, hospitals) and private (office buildings, hospitals) construction, it seems quite clear that the behavior of unions and union contractors varies tremendously with the market environment. In each case where the union-nonunion comparisons are made over a sample of privately owned structures, the productivity of union contractors has turned out to be higher than that of nonunion contractors and the productivity difference has been large enough to offset the difference in wages, making unit costs comparable. In each case where the comparisons are made over a sample of publicly owned structures, there is no union-nonunion productivity difference and the greater cost of union labor is passed on to the government. The most likely explanations for this pattern of behavior are that government managers lack adequate incentives to take steps which would change the behavior of unions and unionized contractors and that prevailing wage laws prevent the market from creating those incentives by effectively banning nonunion contractors from public sector projects in many areas.

NOTES

[1]Other studies examining the effects of unions on productivity are summarized in Freeman and Medoff (1984). For a critique of these studies see Hirsch and Addison (1986).

[2]The price of capital is assumed equal to the average rate of return in the 1977 CCI for all construction contractors in the state in which the project is located. The rate of return equals estimated profits divided by gross book value of capital at the end of the year. Estimated profits equal 35 percent of estimated profits and proprietary income. Estimated profits and proprietary income equal value added less wages and salaries, expenditures for employee benefits, depreciation, rental payments for capital, and estimated net interest and indirect business taxes (which is 19.9 percent of value added less wages, salaries, and benefits). The ratios used to estimate profits and net interest and indirect business taxes are obtained from the national income accounts for construction in 1977; details about how these ratios were constructed are available from the author upon request.

[3]The price of materials is derived from the 1978 Dodge Manual for Building Construction Pricing and Scheduling in the following manner. If the Dodge Manual reports a materials price index for the SMSA in which the project is located, then that value is used. Otherwise, a weighted average of the indexes for all SMSAs in the state with available data is used. The weights are 1977 employment in construction, as reported in Employment and Earnings, May 1978, pp. 124-133.

[4]Christensen and Greene (1976) define economies of scale (EOS) as

$$EOS = 1 - \partial \ln C / \partial \ln Y.$$

In (1) this gives us

$$EOS = 1 - \alpha_Y - \beta_{YY} \ln Y - \sum_i \beta_{Yi} \ln P_i .$$

Union-nonunion differences in EOS are calculated by estimating α_Y, β_{YY}, and β_{Yi} separately for union and nonunion projects.

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Table 1. Relative Frequency Distribution of Selected Building Characteristics, By Union Status

	Union	Nonunion
Stories		
One	60	92
Two	33	0
Three	7	8
Escalators		
None	63	92
One or More	37	8
Heat		
Forced Air	83	75
Radiant (electric)	7	17
Other	10	8
Frame		
Steel	37	58
Concrete	17	0
Masonry	43	33
Wood	3	8
Exterior Wall		
Steel	0	17
Concrete	13	17
Masonry	67	50
Curtain Wall	3	17
Other	17	0
Structure		
Dept. Store	33	33
Grocery	20	8
Restaurant	7	8
Other Store	7	8
Mall	13	17
Other Shopping Ctr	20	25

	Union	Nonunion
Interior Wall		
Drywall	80	75
Masonry	10	17
Other	10	8
Floor Covering		
Wood	3	8
Terrazzo	7	0
Vinyl	50	67
Other	20	17
None	20	8
Roof Base		
Steel Decking	53	92
Concrete	7	8
Wood or Plywood	40	0
Roof Cover		
Shingles	17	0
Built-up	70	92
Tile	7	0
Other	7	8
Foundation		
Masonry	10	8
Concrete	83	92
Other	7	0

Table 2. Production Function Estimates

	Productivity Measure			
	Value Added per Hour		Square Feet per Hour	
	(1)	(2)	(3)	(4)
log (K/L)	.245**	.311**	.229	.199*
	(.077)	(.094)	(.197)	(.106)
log (L)	-.008	.027	-.054	-.101
	(.031)	(.082)	(.080)	(.092)
Union	.275**	.390**	.083	.414**
	(.087)	(.137)	(.224)	(.154)
Building Characteristics Included	no	yes	no	yes
σ	.206	.178	.527	.200
R^2	.483	.811	.121	.938
F	5.45**	3.04**	.81	10.77**
Mean (S.D.) of Dependent Variable	3.000	3.000	.465	.465
	(.264)	(.264)	(.519)	(.519)

NOTE: Each equation also includes three region dummies. The additional building characteristics included in columns (2) and (4) are number of stories, presence of an escalator, type of frame, type of floor covering, type of foundation, type of roof base, type of roof covering, type of heating, whether the building was a grocery and whether the building was a mall.

*Significant at 10% level

**Significant at 5% level

Table 3. Cost Per Square Foot By Size of Building and Union Status

	Number of Observations		Cost Per Square Foot		
Sample	Union	Nonunion	Union	Nonunion	Union / Nonunion
Entire Sample	30	12	20.2 (11.5)	18.2 (11.3)	1.11
35,250 sq. ft. or less	12	2	21.0 (13.9)	34.5 (27.3)	.61
35,251-99,999 sq. ft.	8	6	22.9 (14.0)	14.9 (2.2)	1.54
100,000 sq. ft. or more	10	4	17.0 (3.9)	15.2 (1.4)	1.12

NOTE: Standard deviations are reported in parenthesis. The hypothesis of no cost difference cannot be rejected in any case.

Table 4. Log Likelihood Ratio Tests of Cost Function Restrictions

		Cost Function Restrictions			Equality of Union and Nonunion Coefficients	
Restrictions	Degrees of Freedom	Tests for Union Sample	Tests for Nonunion Sample	Tests for Pooled Sample	Degrees of Freedom	Tests
None	---				10	.5
$\beta_{Yi}=0$	2	3.9	1.5	2.9	8	4.6
$\beta_{Yi}=\beta_{YY}=0$	3	5.0	21.9*	13.0*	7	10.6
$\beta_{ij}=0$	3	5.0	4.9	28.7*	7	11.0
$\beta_{ij}=\beta_{Yi}=0$	5	9.8	6.2	31.3*	5	11.9*
$\beta_{ij}=\beta_{Yi}=\beta_{YY}=0$	6	11.2	27.9*	41.8*	4	18.9*

*Significant at 5% level

Table 5. Translog Cost System Estimates, Pooled and by Union Status

	Union	Nonunion	Pooled	Union	Nonunion
α_O	7.933	16.756**	14.394**	8.738	17.569**
	(4.648)	(1.901)	(3.250)	(4.476)	(1.642)
α_U			-.215		
			(.135)		
α_Y	.040	-1.587**	-1.012*	-.118	-1.665**
	(.864)	(.347)	(.608)	(.837)	(.311)
β_{YY}	.078	.225**	.175**	.090	.232**
	(.080)	(.032)	(.056)	(.078)	(.029)
α_L	.150	.472	-.277**	.390**	.263**
	(.181)	(.292)	(.126)	(.011)	(.011)
α_M	.724**	.677**	1.146**	.574**	.676**
	(.180)	(.265)	(.120)	(.011)	(.014)
β_{YL}	.003	-.048	.009		
	(.070)	(.107)	(.008)		
β_{YM}	-.056	.149	-.012		
	(.073)	(.106)	(.008)		
β_{LL}	.030	-.042	.206**		
	(.069)	(.095)	(.039)		
β_{MM}	.016	.003	.150**		
	(.009)	(.013)	(.040)		
β_{LM}	-.017	-.009	-.169**		
	(.009)	(.014)	(.037)		
Mean Factor Shares:					
Labor	.389	.263	.353	.389	.263
Materials	.575	.675	.603	.575	.675
Capital	.036	.062	.044	.036	.062
Means of Independent Variables:					
ln Y	10.844	11.030	10.898	10.844	11.030
ln P_L	2.400	1.924	2.264	2.400	1.924
ln P_M	.002	-.045	-.011	.002	-.045
ln P_K	-1.599	-1.748	-1.642	-1.599	-1.748
N	30	12	42	30	12

*Significant at 10% level
**Significant at 5% level

Table 6. Cost and Economies of Scale By Union Status

	Union	Nonunion
Range of Output	3850 to 558580	2800 to 487879
Restricted Model		
Cost Function at Mean Input Prices	$.045(\ln Y)^2 - .118(\ln Y) + 9.617$	$.116(\ln Y)^2 - 1.665(\ln Y) + 17.939$
EOS Function At Mean Input Prices	$1.118 - .090(\ln Y)$	$2.665 - .232(\ln Y)$
Range of Output Where Cost is Lower	$Y < 16042$; $Y > 180954$	$16042 < Y < 180954$
Range of Output Where EOS > 0	$Y < 248202$	$Y < 97441$
Model Without Restrictions		
Cost Function At Mean Input Prices	$.039(\ln Y)^2 + .079(\ln Y) + 8.244$	$.112(\ln Y)^2 - 1.590(\ln Y) + 17.528$
EOS Function At Mean Input Prices	$.921 - .078(\ln Y)$	$2.590 - .225(\ln Y)$
Range of Output Where Cost is Lower	$Y < 14214$; $Y > 597793$	$14214 < Y < 597793$
Range of Output Where EOS > 0	$Y < 134281$	$Y < 99819$

Table 7. Hedonic Price Equation Estimates

	Mean (S.D)	(1)	(2)
Union	.714 (.457)	.038 (.164)	-.015 (.104)
log (Y)	10.898 (1.262)	.842** (.061)	.798** (.068)
Northeast	.167 (.377)	.121 (.228)	.287** (.138)
North Central	.238 (.431)	-.054 (.212)	.137 (.137)
West	.357 (.485)	-.196 (.203)	.238** (.118)
Building Characteristics Included		no	yes
σ		.436	.215
R^2		.881	.979
F		53.10**	80.65**
Mean (S.D.) of Dependent Variable		14.048 (1.182)	14.048 (1.182)

NOTE: Building characteristics are number of stories, type of heat, type of floor covering, type of heating fuel, type of roof covering, type of exterior wall, presence of an escalator, and whether the building was a restaurant.

**Significant at 5% level

Table 8. Profit and Overhead As A Percentage Of Building Price By Union Status

	No Adjustment For Employee Benefits	Estimate For Employee Benefits Subtracted From Profits For Union Contractors
Union	28.0 (6.6)	24.3 (7.0)
Nonunion	25.4 (6.0)	25.4 (6.0)

NOTE: The hypothesis of equal mean profit and overhead rates for union and nonunion contractors cannot be rejected in either comparison. Standard deviations are reported in parentheses.