NBER WORKING PAPER SERIES

COST IMPLICATIONS OF HOSPITAL UNIONIZATION: A BEHAVIORAL ANALYSIS

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Working Paper No. 946

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge MA 02138

July 1982

This research was supported by Grant HS 03016 from the National Center for Health Services Research, U.S. Department of Health and Human Services. I wish to thank Michele Alperin, Alison Jones, Bruce Lubich and Aileen Ormiston for programming assistance and for helping to assemble the data used in the analyses reported here. Substantial assistance in data preparation and in preparing this manuscript was provided by Valerie Knell and Dorothy Kolis. The research reported here is part of the NBER's research program in Health Economics. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

NBER Working Paper #946
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ABSTRACT

The growth of unionization among hospital workers was sharply accelerated by the 1974 amendments to the NLRA covering voluntary hospital workers. With continuing inflationary pressures in the hospital sector, the cost implications of the recent and projected growth of hospital unions is of some concern to policy-makers. This paper presents estimates of union cost impacts based on data from hospitals in the states of Maryland, Massachusetts, New York, and Pennsylvania. Cross-sectional regressions with data for 1975 yield positive union impacts of 3.3 percent on total costs, 4.1 to 5.9 percent on cost per case, and 6.1 percent on cost per day. Re-estimation of the model with data on changes over the 1971-75 period yields similar results. We also find that the cost impact of unionization varies with the pattern of coverage (being lower for service employees and RN's) and with the extent of cost-based reimbursement. This suggests that future cost impacts of union growth may be moderated as prospective payment systems for hospitals become more widespread.

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COST IMPLICATIONS OF HOSPITAL UNIONIZATION: A BEHAVIORAL ANALYSIS

I. Introduction

Since the coverage of voluntary hospital employees under the National Labor Relations Act in August of 1974, the extent of unionization among hospital employees has increased steadily. According to data from the American Hospital Association annual surveys, over the 1973-1980 period the percentage of voluntary hospitals with union contracts rose from 15.7 to 23.2.[1] Further union growth is expected over the next decade; several recent studies of unionization trends project that between 45 and 65 percent of hospitals will have union contracts by 1990.[1,2]

In the face of strong inflationary pressures in the hospital sector, and continuing debate about appropriate policy responses, it is important that we understand the inflationary implications of the expected growth in unionization. Although empirical studies of hospital costs have been numerous, analysis of union impacts on costs has been rather limited. Most recent econometric research has been confined to one aspect of union cost impacts, namely, impacts on wages.[2-5] Evidence from other industries, however, suggests that union effects on non-wage variables such as turnover, worker quality, and productivity may also be important,[6,7] Several recent studies[8,9] have estimated quasi-technological cost functions to measure union effects on the cost of producing a given level and mix of hospital output, but possible impacts on unit and total costs resulting from the response of output levels and mix to unionization are not captured in this methodology. In contrast, reduced-form behavioral cost regressions can capture these effects on output levels and thus provide a more comprehensive

estimate of union cost impacts. Two recent studies of union cost impacts have used this approach and reported positive union effects on cost per day (ranging from 3.5 to 10.2 percent) and cost per case (ranging from 4.1 to 9.0 percent).[10,11]

The present study provides additional evidence of union impacts based on this behavioral approach. It differs from the two studies just cited in several respects. First, it presents estimates of union impacts on both total and unit costs. Second, it utilizes detailed information on the duration, extent, and pattern of employee unionization to construct a series of independent variables describing each hospital's collective bargaining status. Third, to control for selectivity effects of omitted variables that are correlated with collective bargaining status, it presents estimates of union cost impacts on both the level of costs in 1975 and the change in costs over the 1971-75 period.[12] Fourth, to construct the dependent variables, the present study uses data from audited Medicare cost reports rather than the unaudited cost data from the American Hospital Association (AHA) Annual Surveys.[13]

II. Data and Model Specification

The analyses reported here are based on data for fiscal years 1971 and 1975 from short-term non-Federal hospitals in four Northeastern states: Maryland, Massachusetts, New York and Pennsylvania. These hospitals were identified from the listings in the 1976 AHA Guide to the Health Care Field. For fiscal year 1975, complete data were obtained on 617 of the roughly 700 hospitals in these four states listed in the Guide. Complete data for both fiscal 1971 and fiscal 1975 were obtained on 440 hospitals.

The dependent and independent variables used in the analyses are defined in Table 1. (Details on the construction of these variables and data sources are given in the Appendix.) Values for the dependent variables were obtained from Medicare Cost Reports. For the 1975 cross-sectional analysis, the cost concept used to define the dependent variables (i.e., total reimbursable costs after Medicare adjustments) is computed as total operating expenses (including depreciation) minus direct expenses for non-reimbursable cost centers (e.g., gift shops, research) and for personal patient care services rendered by physicians. Since a comparable cost concept was not used in the 1971 cost reports, the dependent variables for the analysis of 1971-75 changes are based on total operating expenditures.

Our specification of independent variables follows that of previous behavioral cost models.[14] The hospital is viewed as making decisions about product prices, quality, and input quantities so as to maximize an objective function subject to prevailing input and output market conditions and technological constraints. Hence, the level of costs which results from these decisions is a function of the exogenous determinants of product demand and factor prices in the hospital's market area. Hospital characteristics relating to ownership (PROP, GOV, CATH) and teaching activities (NURS, MED, DRESIDNT) are included to capture differences in hospital objectives; however, effects of these variables on costs may also reflect product-mix differences (including the mix of educational services versus patient care services produced by the hospital) and factor-supply effects (e.g., the availability to Catholic hospitals of labor inputs from members of religious orders). Capital stock variables (LBDA, ECFRAT, INDEX, INDEXD)

capture the effects of variations in fixed capital inputs as well as product-mix differences.[15] The geographical dummies (MASS, MD, NYC, NYNNYC) are listed in Table 1 as factor-price variables but they also serve to control for differences in the timing of fiscal years.[16]

Several different aspects of each hospital's collective bargaining situation are captured by our unionization variables. In addition to a dummy variable for the presence of a collective bargaining agreement (UNION), we have used data on the employee groups covered by agreements to construct a proxy for the fraction of the hospital work force covered (COV). The hypothesis that union cost impacts vary with the types of employees covered is tested by including dummy variables for the coverage status of the two largest employee groups, service employees (DSV) and registered nurses (DRN), which respectively comprise roughly 38 and 30 percent of the hospital work force. Since large national unions may have greater expertise in bargaining, greater resources to endure conflicts, and a stronger interest in economic issues than professional organizations (such as state nurses' associations), we have tested for differences in cost impacts among types of unions by including a national union dummy (DNATLUN). Cost implications of "Balkanization" of the work force into different bargaining units represented by different unions are explored by including the number of unions in the hospital (TOTALUN). Variations in cost impacts with the duration of the collective bargaining relationship are allowed for by including the duration variables UN74 and UN71.

All regressions were estimated with ordinary least squares. As is indicated in Table 1, the dependent variables and most independent variables were entered as logarithms. Those independent variables which took on zero values for any data points, such as the unionization variables, were entered in linear form.

III. Characteristics of the Study Sample

Average characteristics of the unionized and non-unionized hospitals in the study sample are compared in Table 2. In the 1975 cross-sectional analysis, 236 unionized hospitals and 381 non-unionized hospitals comprise the study sample. In the analysis of 1971-75 changes, hospitals with any collective bargaining agreements in effect for at least half of fiscal 1971 were excluded; thus, the 106 unionized hospitals in this analysis became unionized during the 1971-75 period. (Some hospitals were also excluded from this analysis because of missing data for fiscal 1971.)

Comparison of fiscal 1975 data reveals that unionized hospitals were on average much larger than non-union hospitals; exponentiating the logarithmic means for LBDA and dividing by 365 days yields bed complement figures of 236 and 150 for union and non-union hospitals respectively.[17] The difference in logarithmic means for LREA implies a total cost level in union hospitals that is 103 percent higher; corresponding differentials for cost per case and cost per day are 74 percent and 24 percent respectively. Mean values for LMCAID and LDEN indicate that union hospitals tend to be located in more densely populated areas with a higher percentage of public aid recipients. The union sample also contains proportionately more government hospitals (13.6 percent vs. 3.9 percent), more hospitals with medical ~~school~~

school affiliations (33.9 percent vs. 16.5 percent) and residency programs (44.9 percent vs. 24.7 percent), more hospitals in Massachusetts and in New York City, and proportionately fewer hospitals in Maryland and Pennsylvania. Among the unionized hospitals, 68.1 percent have contracts with national unions,[18] the average estimated fraction of the workforce unionized is 55.4 percent, and the average number of unions representing workers in each hospital is 1.84.

Looking at the 1971-75 changes, we see that the average total cost increase is higher for the hospitals unionized during this period (70.6 percent) than for the non-union hospitals (65.5 percent). The differential in the percent increase of cost per case is only slightly smaller (59.5 vs. 54.8) while the corresponding differential in cost per day is larger (73.8 vs. 65.2). Comparison of average changes in variables that might indicate external inflationary pressures (LCOL, LAVEW, PCINC) suggests that such pressures can not explain much of the difference in rates of cost increase between newly-unionized and non-union hospitals; however, a more careful assessment of this question requires that we examine the full set of regression results presented below. Also note that the mean value for UN74 in the newly-unionized sample indicates 26.4 percent of these hospitals had no union contracts until fiscal 1974 or 1975 while 73.6 percent had such contracts prior to fiscal 1974. Thus, the estimated union effects in the analysis of 1971-75 changes reflects at least several years' experience with collective bargaining for most of the newly-unionized hospitals.

IV. Regression Results

We consider first our summary estimates of average union impacts obtained by including the UNION dummy and all other independent variables not pertaining to unionization.[19] For each dependent variable, regressions were estimated with all these independent variables included; then a second round of estimates was obtained excluding variables with t-statistics less than 1.0. This two-step process was then repeated excluding HWI since this variable was based on reported payroll expenses for the individual hospitals and therefore might be regarded as endogenous. (The construction of HWI is described in the Appendix.)

Results are reported in Tables 3 and 4 for the second round of regression estimates.[20] In the 1975 cross-section (Table 3), the UNION coefficients indicate positive cost impacts of roughly 3.3 percent on total costs (LREA), 4.1 to 5.9 percent on cost per case (LREADIS), and roughly 6.1 percent on cost per day (LREADAY). Coefficients in both of the total cost and one of the cost per case regressions fall just short of the 0.10 significance level (two-tailed) while the other three UNION coefficients are highly significant.

In comparison with these results, the estimated UNION coefficients based on 1971-75 changes (Table 4) are remarkably similar. The coefficient magnitudes in the cost per case and cost per day regressions are slightly smaller, indicating positive cost impacts of 3.4 to 3.9 percent and 5.3 to 5.8 percent respectively. Moreover, t-statistics exceed the critical values for the 0.10 significance level in all cases.[21]

Results for the other independent variables are less consistent. In the 1975 cross-section, coefficients for INDEX (or INDEXD), HWI, MD, MED and ECFRAT are always positive and significant while the proprietary hospital dummy (PROP) is always significantly negative. Other variables that are

significant in at least one regression for each of the three dependent variables are MASS, LCOL, and SURGRAT, though the negative sign of the latter's coefficients is somewhat surprising. Among the remaining variables, CBINS1 and GOV are consistently positive and usually significant in the unit cost (LREADIS and LREADAY) regressions but do not significantly affect total costs (LREA). Conversely, LHPOP, LMCAID, INSUR1, and LBDA are signifcant in at least one LREA regression but none of the unit cost regressions. LAVEW, PCINC, DRESIDNT, and LGPPOP were not significant in any of the 1975 cross-section regressions. (The first three of these variables were not included in the regressions shown in Table 3 since they had t-statistics less than 1.0 in all first-round regressions.)

In the analyses of 1971-75 changes, the explanatory power of the regressions was somewhat lower and the number of significant variables was smaller, particularly in the cost per case (LEXBDIS) regressions. Moreover, results for many of the variables were not qualitatively similar to the corresponding 1975 cross-section estimates.[22] In view of this variability in results, the stability of the estimated union impacts seems even more striking.

Regression results with a more detailed specification of each unionized hospital's collective bargaining situation are presented in Tables 5-7. As before, all regressions were first estimated with all other independent variables included and then re-estimated deleting these variables with t-statistics less than 1.0.[23] In addition to examining the cost impacts of variations in the extent, pattern, and duration of union coverage, we also tested three interaction hypotheses relating to unionization. First, CBINS1 x COV was included to test the proposition that union impacts on costs would be more positive when they could be passed through to third parties under cost based reimbursement schemes.[24] Second, it has been suggested that multi-employer

bargaining exerts a countervailing power that reduces union cost impacts;[9] since New York City is the only locality in our study states with multi-employer bargaining, we test this hypothesis by including the interaction variable NYC x COV. Third, the inclusion of (NYC + NYNNYC) x COV allows for a differential effect of the extent of collective bargaining coverage in New York State which might result from the influence of rate regulation.[25]

Looking first at the 1975 cross-sectional results for total costs (LREA) in the first three columns of Table 5, we observe that COV, DSV, and DRN are nearly significant with HW1 excluded and become significant when HW1 is included or when other clearly insignificant unionization variables (TOTALUN, UN71, UN74) are excluded.[26] The negative coefficients for DSV and DRN imply that the inflationary impact of union contracts for service workers and registered nurses is smaller than for other employee groups; in fact, the magnitudes of coefficients suggest this impact is actually negative.[27]

Analogous regressions with data on 1971-75 changes (columns 7-9 of Table 5) show a similar pattern of results but with several important differences. In particular, the coefficients for COV are smaller and less significant while the coefficients for TOTALUN are now strongly positive when HW1 is included or DNATLUN is excluded. The large and significant negative coefficients for UN74 imply that union impacts on total costs are not positive during the first two years of unionization.[28]

Tests of the three interaction variables with cross-sectional data (columns 4-6) yield positive and significant coefficients for CBINS1 x COV, as predicted by the cost-pass-through hypothesis; however, this result is weaker in the 1971-75 change regressions (columns 10-12). The two other interaction coefficients are never significant. Also note that inclusion

of the interaction variables does not dramatically change the results for most other unionization variables. The one exception to this is COV which is highly correlated with the interaction variables (particularly CBINS1 x COV) by construction. Because of this high correlation, one would expect the coefficients of CBINS1 x COV and COV to have opposite signs.[29] Note, however, that the negative coefficients obtained for COV when CBINS1 x COV is included do not imply a negative partial effect of COV on total cost. For example, the results in column 6 imply that the partial effect of COV will only be negative if CBSINS1 is less than 3.44; in fact, no observed values of CBINS1 were this low.

The cost per case regressions (Table 6) yield a similar pattern of results to the total cost regressions. Once again COV, DSV, and DRN are generally significant, particularly in the cross-section regressions, but the magnitudes of their coefficients are slightly larger. TOTALUN is again strongly positive in the 1971-75 change regressions except when the hospital-specific wage variable (HW1) is included. While the coefficients for the recent unionization variable (UN74) are again consistently negative, their magnitudes and significance are now greater in the cross-section regressions and smaller in the 1971-75 change regressions. Regressions with the interaction variables again tend to confirm the cost-pass-through hypothesis but they also yield a significantly negative NYC x COV interaction coefficient in the cross-section analysis. This supports the multi-employer bargaining hypothesis stated earlier.

Our final set of regression results pertains to cost per day (Table 7). Although the same general pattern of results emerges, a few differences from the total cost and cost per case regressions should be noted. First,

the national union (DNATLUN) coefficient is more positive and significant in all 1975 cross-section regressions. Second, the negative DRN coefficients are weaker in the cross-section regressions but stronger in the 1971-75 change regressions. Third, the interaction results in the 1971-75 change regressions are rather different: NYC x COV coefficients are more strongly positive, the New York State interaction ((NYC + NYNNYC) x COV) is more strongly negative, and the cost-pass-through variable (CBINS1 x COV) has no perceptible effect.[30]

V. Discussion

The various regression models described here all confirm the basic result that unionization increases the cost of hospital services. Thus, it appears that gains in hospital productivity (due to improved worker quality, lower turnover, or management responses to unionization), to the extent that they occur at all, are not sufficient to offset union-induced employee compensation increases. While we did not derive separate cost impact estimates for wage and non-wage (i.e., productivity) effects of unionization, conjectures about the magnitudes of these separate effects can be based on estimates of the wage-elasticity of costs and union impacts on compensation. Our own coefficient estimates for HW1 indicate a wage-elasticity of costs of approximately +0.5 in cross-section data (Table 3), but are much smaller and less significant in the regressions on 1971-75 changes (Table 4). Estimates from other studies with pooled data indicate elasticities similar[31] to our cross-section result. Using the +0.5 figure as an approximate consensus estimate, we find that the union cost impacts in the +3.4 to +6.1 percent range (as reported above) would only be consistent with negative non-wage effects (i.e., union-induced

productivity gains) if union compensation effects were above the range +6.8 to +12.2 percent. Our own estimated union compensation effects of +5 percent reported elsewhere[32] as well as those from other studies[2-5] generally tend to be near or below the lower end of this range, suggesting that union-induced nonwage effects are in fact zero or positive. The contrast between this finding and recent reports of union-induced productivity gains in other industries[33] may be a reflection of a more general difference between service and manufacturing industries in responding to unionization, but it could also be explained by special characteristics of the hospital industry such as the prevalence of cost-based reimbursement. The often-significant interactions between unionization and cost reimbursement reported here lend support to the latter of these two explanations.

Several other aspects of our results are of interest. First, the similarity between our cross-section and 1971-75 change regressions indicates that selection bias due to omitted hospital-specific characteristics which are associated with unionization (and stable over time) is not a problem in cross-sectional studies. Second, the fact that union impacts are greatest for per diem costs and smallest for total costs is consistent with a negative union effect on the volume of output. This could be interpreted in the context of the standard behavioral cost model as a movement up the hospital's downward-sloping product demand curve.[34] Moreover, since union impacts on cost per case and total cost are fairly close, it appears that most of the reduction in output volume takes the form of shorter lengths of stay rather than fewer cases treated.[35] The negative output-volume effect implies that projections of growth in total hospital expenditures arising from future increases in unionization may be biased

upward if they are based on results of unit cost regressions, particularly cost per day regressions.

Third, and perhaps most important, our results strongly suggest that union cost impacts vary considerably among hospitals depending upon the types of employees covered, the fraction of the work force covered, the types of unions representing employees and perhaps even the duration of coverage. For example, we have already noted, based on the coefficient estimates from our cross-section total cost regressions (specifically, column 3 of Table 5) that unionization of service workers covered under a union contract with a national union has a minimal impact on costs. By contrast, if all other employees in the hospital are covered as well, a total cost increase of approximately 8 percent would occur according to our estimates.[36]

Previous estimates of future hospital cost increases due to union growth imply that this growth will not be a significant source of inflationary pressure. In particular, Becker et al.[1] have projected that the percent of hospitals with union contracts will increase from 27 percent in 1980 to 45-50 percent in 1990 but that this will increase real hospital spending by only 5 percent in comparison with HCFA projections of overall real spending growth of 58 percent between 1979 and 1990. While this projection was based on cost impact estimates similar to those reported here, our own findings point up several additional factors which might amplify or diminish the projected cost increase. First, since cost impacts increase with the fraction of the work force covered by unions, and since our own data (Table 2) and figures reported elsewhere show that only about half of all employees in unionized hospitals are now covered by union contracts[37], it is clear that future growth in union

coverage within already-unionized hospitals may be an important additional source of inflationary pressures. Second, our estimates suggest that cost impacts for employee groups which are more heavily unionized (e.g., service workers and RN's) are small. If future union growth primarily involves other employee groups, the average cost impact of unionization will rise.[38] Third, in view of the evidence for cost-pass-through union effects presented here, one might at least hope that the shift in hospital payment away from cost reimbursement to prospective mechanisms may serve to moderate the inflationary pressure of future union growth.

Appendix: Data Sources

Dependent variable values were calculated from data on expenditures, discharges, and inpatient days in the Medicare Cost Reports filed by each study hospital; LBDA and ECFRAT were taken from the same source. It should also be noted that ECF bed days available are not included in LBDA or the denominator of ECFRAT. PROP, GOV, CATH, MED, DRESIDNT, and NURS are taken from the 1975 AHA Annual Survey data. INDEX was also constructed from these AHA data in a two-step procedure. First, AHA data for hospitals in all other states (except Alaska and Hawaii) were used to estimate regressions of average cost per case in which dummies for the presence of various facilities and services, for medical and nursing school affiliations, for ownership type, for service specialty code of the hospital, and for geographic location (SMSA size and region) were among the included independent variables. Other independent variables related to bed complement, numbers of interns, residents, and other trainees per case, and the mix of inpatient and outpatient services. Second, the coefficients for the services and facilities dummies, affiliation dummies, service specialty dummies, and interns, residents, and trainees variables were multiplied by the AHA data values for these variables for the study hospitals and the resulting products summed to create INDEX values. INDEXD was created in the same way using a cost-per-day regression based on AHA data.

Unionization data were obtained from a variety of sources including AHA survey information for 1970, 1973 and 1975, state labor relations commissions' files and publications, state hospital associations, unions, NLRB published election reports and unpublished data from NLRB files, and in a few instances telephone contacts with individual hospitals. Per capita income, population, household size, county hospital bed supply and county

physician supply data were taken from the American Medical Association annual publication Physician Distribution and Medical Licensure in the United States. LAVEW was based on service industry payroll data published by the U.S. Commerce Dept. in County Business Patterns for SIC categories 70 (hotels and lodging places) and 72 (personal services). County land area data used to compute LDEN were from the Statistical Abstract of the United States.

LCOL was derived from family budget figures developed by the U.S. Bureau of Labor Statistics (BLS). For hospitals located in the Baltimore, Washington, Boston, Buffalo, New York, Lancaster, Philadelphia and Pittsburgh SMSA's, published SMSA data were used to compute LCOL. For hospitals located in other SMSA's or counties outside SMSA's, a predicted value of LCOL was developed from a regression equation estimated with published BLS data for 39 large SMSA's. Independent variables in this regression were per capita income, population density, SMSA size dummies and census region dummies.

CBINS1 was computed by summing the percentage of the population with regular Blue Cross coverage, the percentage of the population with Medicare coverage, and the percentage of the population with Medicaid coverage. The Blue Cross percentage for the area customarily served by each Blue Cross plan was based on data published in the Blue Cross-Blue Shield Fact Book. This figure was used for each county within the customary service area. The Medicare percentage was based on enrollment figures in U.S. Social Security Administration, Medicare, Health Insurance for the Aged and Disabled, Section 1.1: Reimbursement by State and County. Disabled Medicare

enrollees are only included in the 1975 data since they were not covered in 1971. (The number of over-65 enrollees was also used to compute LAGED.) As a proxy for the number of persons (under 65) covered by Medicaid, we used the numbers of cash recipients under AFDC, SSI (except aged recipients), and general assistance in the county as published in U.S. National Center for Social Statistics, Recipients of Public Assistance Money Payments and Amounts of Such Payments by Program, State, and County and U.S. Social Security Administration, Supplemental Security Income: State and County Data.

To compute INSUR1, we combined the data on Medicare and Medicaid cited above with data from the Health Interview Survey (HIS) of the U.S. National Center for Health Statistics on the percent of the under-65 population with Blue Cross or commercial hospital insurance coverage in Primary Sampling Units (PSU's) within the four study states. Counties within PSU's were assigned the value for the PSU. For counties outside of PSU's, predicted values generated from an insurance coverage regression were employed. Since HIS data were only available for calendar 1972 and 1974, estimates were adjusted to reflect the change in coverage in the entire state from 1971 to 1972 and from 1974 to 1975 as reported by the Health Insurance Institute in their Source Book of Health Insurance Data.

HW1 was derived from AHA Annual Survey data, for each hospital, on average payroll and employee benefit expenses per full-time-equivalent employee. (Physicians, dentists, interns, residents and other trainees, and expenses for these groups were exluded from our calculations.) Regression analysis was used to adjust this average for differences in personnel mix between hospitals and for union impacts on wages. The 1975 regression was estimated from data on the 617 study hospitals plus an additional 35 hospitals which had been excluded from the cost regressions because of missing data but

which met all other criteria for inclusion in the study; for 1971 data on 434 of these hospitals were employed. To calculate HW1, coefficients from this regression were used to adjust observed values of the dependent value for variations in all independent variables except LAVEW, LCOL, and PCINC.

For further details on the hospitals included in the study and our data sources and adjustments, see David Salkever, "The Impact of Collective Bargaining on Hospital Costs," Chapter 4 and Appendices A-F, H, and I.

Footnotes and References

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7. Richard Freeman and James Medoff, "The Two Faces of Unionism." The Public Interest, Fall 1979.
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9. Richard Miller, Brian Becker, and Edward Krinsky, The Impact of Collective Bargaining on Hospitals (New York: Praeger, 1979).

10. Frank Sloan and Bruce Steinwald, Insurance, Regulation and Hospital Costs (Lexington, Mass.: Lexington Books, 1980).

11. Frank Sloan and Killard Adamache, "The Role of Unions in Hospital Cost Inflation," Unpublished paper, Vanderbilt University, 1981.

12. Analysis of a cross-section of changes in costs from 1971 to 1975 is equivalent to pooling 1971 and 1975 cross-sections and including hospital-specific dummies; this controls for effects of any omitted hospital characteristics which are stable over the 1971-75 period.

13. In their comparative analysis of these two sources of cost data, Coelen and Sullivan concluded that the AHA data are "not of high quality" and that "results obtained by using AHA data vary considerably from results obtained using (Medicare cost report) data." See Craig Coelen and Daniel Sullivan, "An Analysis of Effects of Prospective Reimbursement Programs on Hospital Expenditures." Unpublished manuscript, Abt Associates, 1981.

14. For a detailed presentation of such models, see Sloan and Steinwald, Insurance, Regulation, and Hospital Costs and David Salkever and Thomas Bice, Hospital Certificate-of-Need Controls (Washington: American Enterprise Institute, 1979).

15. As explained in the Appendix, values for INDEX and INDEXP depend on each hospital's special facilities and services, educational programs and numbers of trainees as reported in the AHA annual survey data; therefore these values will be related to the mix of both patient care and educational services. Other behavioral models of hospital costs (e.g., Sloan and Adamache, op. cit.) have controlled for the diagnostic mix of inpatients and for the mix between inpatient days (or cases) and outpatient visits.

Even if one views these empirical models, as well as our own, as short-run in nature, it should be recognized that some variation in product mix can occur in the short-run even when most capital inputs are fixed. However, if such short-run variation is small relative to the total variability of product-mix in the hospitals under study, the degree of simultaneity bias introduced by this short-run variation should be relatively unimportant. A more fundamental consideration is that unionization may have long-run effects on product mix and fixed capital inputs. If so, the estimated union cost impacts in these short-run behavioral models may diverge somewhat from the long-run cost impacts. This qualification should be borne in mind in interpreting the results presented here and in other similar studies.

16. For Maryland and Pennsylvania hospitals, the fiscal year covered the period July 1 to June 30. Massachusetts hospitals generally used an October 1 to September 30 fiscal year while New York hospitals used a calendar year. The geographical dummies also control for the influence of rate-setting. Hospital regulation programs were in effect in three study states during fiscal 1975. The program in Maryland took effect in July of 1974, covering all but Medicare and Medicaid patients, but formal rate determinations were not actually made until late 1975. In Massachusetts, rate-setting was introduced for Medicaid patients in April of 1974 and for self-paying and commercially-insured (i.e., non-Blue Cross) patients in August of 1975. Because these programs were limited in scope and were just getting under way during fiscal 1975, their presence exerted little influence on the results reported here. The program in New York, which

covered Blue Cross and Medicaid patients, was initiated in 1970. Although well-established by fiscal 1975, its impact on costs was greatly weakened by a variety of administrative and political problems. Consequently, econometric studies of the New York program's early years show little effect on the level or growth rate of costs. See Coelen and Sullivan, op. cit., and David Salkever, Hospital Sector Inflation (Lexington, Mass.: Lexington Books, 1979). In Pennsylvania, a few hospitals in the western part of the state participated in a voluntary prospective payment system for Blue Cross and Medicare patients during the 1972-75 period. Differences in regulatory impacts on costs among the states were also probably diluted by the Federal Economic Stabilization program which covered all hospitals from August 1971 to April 1974. Thus, it seems unlikely that these differences were a major confounding factor in our analysis.

17. It should be noted, however, that there is considerable overlap in the size distributions of union and non-union hospitals. While the difference in mean values for LBDA between the two groups of hospitals is only 0.455, the standard deviations for this variable exceed 0.7.

18. National unions in the study sample include District 1199 of the National Union of Hospital and Health Care Employees, the Service Employees' International Union, the American Federation of State County and Municipal Employees, the Laborers' International Union, the International Union of Operating Engineers, the International Brotherhood of Firemen and Oilers, and the Teamsters.

19. Note that INDEXD is only included in the regressions on LREADAY and LEXBDAY while INDEX is excluded from these regressions.

20. Results from the initial regressions are presented in Chapter 4 and Appendix J of David Salkever, "The Impact of Collective Bargaining on Hospital Costs." Final Report on Grant HS 03016 submitted to the National Center for Health Services Research, U.S. Dept. of Health and Human Services. The Johns Hopkins School of Hygiene and Public Health, 1981.

21. The initial regression results for UNION were very similar to those reported here. The only notable difference was in the LREADIS regression with HW1 excluded. The UNION coefficient was larger (0.046) and significant at the 0.10 level.

22. The dummy variables in the 1971-75 regressions, except for those pertaining to unionization, were not defined as changes. Thus their interpretation in these regressions is different from the 1975 cross-section. For example, the significantly negative coefficients for NYC and NYNNYC in the LEXBDAY regressions imply that the rate of increase (i.e., the logarithmic change) in cost per day was significantly lower in New York than in Pennsylvania (the omitted geographic category).

23. As in the regressions already presented, INDEX was replaced by INDEXD in the cost per day regressions, and all regressions were estimated with and without HW1. Also note that UN71 was not included in the 1971-75 change regressions, and that because of missing data these regressions were estimated with data from only 411 hospitals when HW1 was included.

24. Ronald Miller, "Collective Bargaining in Nonprofit Hositals." Ph.D. thesis, University of Pennsylvania, 1969.

25. A special circumstance which might tend to diminish any detectable regulation effect is that prior to 1975, union-negotiated wage increases were passed through in the New York rate-setting system. See Diane Hamilton and Gilbey Kamens, National Hospital Rate-Setting Study, Vol. VII: Case Study of Prospective Reimbursement in New York, U.S. Health Care Financing Administration, April 1980.

26. When DNATLUN is also excluded, the coefficients for COV, DSN, and DRN become slightly larger and more significant.

27. We noted earlier that service employees and RN's comprise about 38 and 30 percent of the hospital work force respectively. (These figures are based on national data from the U.S. Bureau of Labor Statistics. For details on their derivation, see Salkever, "The Impact of Collective Bargaining on Hospital Costs," Appendix E.) Using these figures and the COV, DSV, and DRN coefficients in Column 3 of Table 5, we can calculate the predicted effects of service employee and RN unionization on LREA as (0.38 x 0.321 - 0.165) = -0.04 and (0.30 x 0.321 - 0.124) = - 0.03 respectively. Of course, if we add the estimated effect of national unions (DNATLUN) since these unions commonly represent service employees, the cost impact figure for this group would become weakly positive.

28. For example, using the coefficients estimates from column 9 of Table 5, the mean values for TOTALUN, COV, DSV, and DRN from column 3 of Table 2, and setting UN74 = 1 yields an estimated overall union effect of -0.004.

29. The reason for this can be seen by considering the regression model $X_3 = a + b_1 X_1 + b_2 X_2$. The least-squares estimates of the b's in this model can be expressed in terms of zero-order correlation coefficients (r_{ij}'s) and standard deviations (S_i's) as follows: $b_1 = (r_{31} - r_{32} r_{12}) S_3/(1 - r_{12}^2) S_1$ and $b_2 = (r_{32} - r_{31} r_{12}) S_3/(1 - r_{12}^2) S_2$. When r_{12} is close to 1.0 because of collinearity, the signs of b_1 and b_2 will generally be the same as the signs of $(r_{31} - r_{32})$ and $(r_{32} - r_{31})$ respectively. I am indebted to Michael Grossman for this observation.

30. Regressions with a variety of combinations of the unionization variables, in addition to those shown here, were also computed. Results generally showed a similar pattern of union effects to that reported here. However, because of collinearity among the unionization variables, there were a few minor variations in findings which should be noted. First, in the regressions on LREADIS, the DNATLUN coefficient often becomes positive and significant when COV, TOTALUN, and CBINS1 x COV are excluded; the New York State interaction also became significant when (CBINS1 x COV) and COV were excluded. Second, in regressions on the change in LEXBDIS, the New York State interaction coefficient becomes significantly negative when DNATLUN, TOTALUN, and UN74 are deleted. Third, in the regressions on LREADAY, the coefficient of NYC x COV becomes smaller and much less significant when COV is excluded. Fourth, in the regressions on the change in LEXBDAY, the coefficients for DSV and DRN become insignificant when both COV and CBINS1 x COV are deleted, while the CBINS1 x COV coefficient becomes positive and significant when

COV is deleted. These results are reported in Salkever, "The Impact of Collective Bargaining on Hospital Costs," Chapter 4 and Appendix J.

31. These other studies, which estimated wage elasticities of cost per case and per day, are: Frank Sloan, Roger Feldman, and Bruce Steinwald, "Effects of Teaching on Hospital Costs," Journal of Health Economics (forthcoming) and Sloan and Adamache, op. cit. Adamache and Sloan (op. cit.) combine these estimates with the presumption (based on previous research) that the wage-elasticity of patient days is -0.1 to arrive at a wage elasticity for total costs of 0.47.

32. David Salkever, "Cost Implications of Hospital Unionization: New Estimates and a Review of Recent Research," in R. Scheffler and L. Rossiter (eds.), Advances in Health Economics and Health Services Research, Vol. 4 (Greenwich, Conn.: JAI Press, forthcoming).

33. Charles Brown and James Medoff, "Trade Unions in the Production Process," Journal of Political Economy, June 1978; Kim Clark, "Unionization and Productivity: Micro-Econometric Evidence," Quarter Journal of Economics, December 1980.

34. The price elasticity of demand for days of care implied by the difference between the cost impact estimates can be calculated using the UNION coefficients in Tables 3 or 4. For example, since LREA = LPD + LREADAY (where LPD is the logarithm of patient days), it is true that ∂ LREA/∂ UNION = [(∂ LPD/∂ LREADAY) + 1] x ∂LREADAY/∂ UNION. If cost per day is approximately equal to the average gross price, LREADAY plus the logarithm of the

average coinsurance rate approximates the logarithm of net price and ∂ LPD/∂ LREADAY is approximately equal to the price elasticity of demand. To calculate this price elasticity, we divide the UNION coefficient in the LREA regression by the UNION coefficient in the LREADAY regression and subtract 1.0 from the result. Thus, the estimates in Table 3 yield a price elasticity of patient days of roughly -0.4

35. This is consistent with a larger price-elasticity for days of care by patients in the hospital than for admissions. Note, however, that in the cross-section regressions with HWI included, the union impact on cost per case is almost equal to the cost per day impact.

36. Letting COV, DSV, DRN and DNATLUN all equal 1.0, their combined effect on LREA is +0.08, which implies a percentage cost increase of 8.3.

37. According to Current Population Survey data for the late 1970's, about 15 percent of all hospital workers were union members. (Brian Becker, Glen Cain, Catherine McLaughlin, Richard Miller and Albert Schwenk, "The Union Impact on Hospitals: A National Study." Final Report on Grant HS 02661 submitted to the U.S. National Center for Health Services Research. Industrial Relations Research Institute, University of Wisconsin - Madison, January 1981, Chapter 2. Since 27.4 percent of all hospitals had union contracts in 1980 (Becker, Sloan and Steinwald, op. cit.), and since these hospitals were larger on average than non-union hospitals, it is doubtful that more than half of the employees in these unionized hospitals were covered by union contracts.

38. On the other hand, the fact that the already-unionized hospitals are larger suggests that the total cost impact of unionization spreading to new hospitals will be smaller.

TABLE 1: DEFINITIONS OF DEPENDENT AND INDEPENDENT VARIABLES

Variable Type	Name	Definition
Dependent, 1975 Cross-Section	LREA	Logarithm of reimbursable expense after adjustments
	LREADIS	Logarithm of reimbursable expense after adjustments per discharge
	LREADAY	Logarithm of reimbursable expense after adjustments per inpatient day
Dependent, 1971-75 Changes	LEXB	Logarithm of operating expense
	LEXBDIS	Logarithm of operating expense per discharge
	LEXBDAY	Logarithm of operating expense per inpatient day
Product Demand	PCINC	Logarithm of county per capita income (deflated)
	INSUR1	Logarithm of percent of county population covered by hospital insurance
	CBINS1	Logarithm of percent of county population covered by cost-based hospital insurance
	LMCAID	Logarithm of percent of county population receiving public assistance and SSI, except old-age asssistance (Medicaid proxy)
	LAGED	Logarithm of the percent of the county population age 65 or over
	LHSIZE	Logarithm of average number of persons per household in the county
	LDEN	Logarithm of county population density
	LHBPOP	Logarithm of county population multiplied by ratio of beds in the hospital to short-term beds in the county
	LPHYSPOP	Logarithm of physicians in office-based practice per thousand population in the county
	LGPROP	Logarithm of general practitioners per thousand population in the county
	SURGRAT	Ratio of surgeons to total physicians in office-based practice
Capital Stock	LBDA	Logarithm of bed-days available in the hospital in the fiscal year
	ECFRAT	Ratio of ECF to hospital bed days available
	INDEX	Costliness index of facilities and services (based on cost per admission)
	INDEXD	Costliness index of facilities and services (based on cost per day)

Table 1 (Continued)

Variable Type	Name	Definition
Factor Price	LCOL	Logarithm of living costs
	LAVEW	Logarithm of average service industry payrolls in the county
	HW1	Hospital-specific wage adjusted for unionization
	MD	Maryland dummy
	MASS	Massachusetts dummy
	NYC	New York City dummy
	NYNNYC	New York non-New York City dummy
Hospital Characteristics	PROP	Proprietary hospital dummy
	GOV	State or local government hospital dummy
	CATH	Catholic hospital dummy
	MED	Medical-school affiliation dummy
	DRESIDNT	AMA-approved residency dummy
	NURS	Nursing-school dummy
Unionization	UNION	Collective bargaining agreement dummy
	COV	Estimated percent of employees covered by collective bargaining
	TOTALUN	Number of unions covering employees in the hospital
	DNATLUN	National union dummy
	UN74	Dummy for hospital where collective bargaining started after fiscal 1973
	UN71	Dummy for hospital where collective bargaining started prior to fiscal 1973
	DSV	Dummy for hospital where any service workers are covered by a collective bargaining agreement
	DRN	Dummy for hospital where any registered nurses are covered by a collective bargaining agreement

TABLE 2: MEAN VALUES FOR DEPENDENT AND INDEPENDENT VARIABLES

	Fiscal 1975		1971-75 Changes *	
	Unionized Hospitals (n=236)	Non-Unionized Hospitals (n=381)	Unionized Hospitals (n=106)	Non-Unionized Hospitals (n=334)
LREA	16.210	15.501		
LREADIS	7.243	6.947		
LREADAY	5.083	4.867		
LEXB			0.535	0.504
LEXBDIS			0.467	0.437
LEXBDAY			0.553	0.502
LHPOP	10.776	10.425	0.028	0.011
LMCAID	2.045	1.728	0.174	0.184
LAGED	2.442	2.398	0.037	0.031
LBDA	11.364	10.909	0.033	0.033
LHSIZE	1.055	1.096	-0.070	-0.073
LDEN	7.459	6.349	0.007	0.018
LPHYSPOP	-6.654	-6.823	0.096	0.111
SURGRAT	0.269	0.274	-0.037	-0.020
LGPPOP	-8.511	-8.496	-0.183	-0.179
INSUR1	4.538	4.556	0.049	0.063
CBINS1	4.331	4.270	0.080	0.081
PCINC	-1.150	-1.162	-0.022	-0.012
LCOL	9.689	9.639	0.330	0.327
LAVEW	8.551	8.443	0.212	0.211
ECFRAT	0.049	0.055	0.044	0.035
NURS	0.225	0.199	0.236	0.207
PROP	0.038	0.052	0.009	0.042
GOV	0.136	0.039	0.123	0.039
CATH	0.102	0.165	0.113	0.171
MED	0.339	0.165	0.255	0.180
DRESIDNT	0.449	0.247	0.349	0.260
MASS	0.225	0.152	0.236	0.159
MD	0.038	0.097	0.009	0.111
NYC	0.225	0.029	0.057	0.033
NYNNYC	0.288	0.302	0.274	0.323
INDEX	0.324	0.250	-0.020	0.003
INDEXD	0.523	0.413	-0.059	-0.036
TOTALUN	1.841		1.472	
DNATLUN	0.681		0.604	
DSV	0.614		0.500	
DRN	0.606		0.538	
COV	0.554		0.472	
UN74	0.128		0.264	
HW1**	9.205	9.135	0.315	0.337
UN71	0.728			

* Mean values for NURS, PROP, GOV, CATH, MED, DRESIDNT, MASS, MD, NYC and NYNNYC are based on the 1975 values of these variables. For all other variables, mean values are for changes from 1971 to 1975.

** Because of missing data, 1971-75 changes for HW1 are calculated for 99 unionized hospitals and 312 non-unionized hospitals.

TABLE 3: 1975 CROSS-SECTION REGRESSION RESULTS WITH UNIONIZATION DUMMY
(t-statistics in parentheses)

Dep. Vble.	LREA	LREA	LREADIS	LREADIS	LREADAY	LREADAY
LHPOP	0.142[c]	0.130[c]			0.030	
	(4.47)	(3.95)			(0.97)	
LMCAID		0.041[a]				-0.001
		(1.84)				(0.07)
LAGED					-0.095	-0.150[b]
					(1.63)	(2.39)
LBDA	0.924[c]	0.948[c]			-0.030	
	(23.12)	(24.20)			(0.84)	
LHSIZE			-0.470[c]	-0.644[c]		-0.123
			(2.87)	(4.48)		(0.83)
LDEN	0.031[c]		0.061[c]	0.053[c]		
	(2.76)		(5.67)	(5.35)		
LPHYSPOP	0.141[c]	0.140[c]			0.130[c]	0.091[c]
	(3.75)	(4.75)			(5.11)	(4.35)
SURGRAT	-0.339[a]	-0.190	-0.517[c]	-0.382[b]	-0.343[b]	-0.197
	(1.86)	(1.11)	(2.66)	(2.03)	(2.29)	(1.50)
LGPPOP	-0.049	-0.051				
	(1.20)	(1.42)				
INSURI	-0.238[a]	-0.427[c]				
	(1.68)	(2.98)				
CBINSI		0.119	0.125	0.197[b]	0.191[c]	0.150[b]
		(1.33)	(1.19)	(1.96)	(2.63)	(1.98)
LCOL	0.673[b]	0.638[c]	0.658[a]		1.052[c]	0.502[b]
	(2.23)	(2.67)	(1.88)		(5.64)	(2.57)
ECFRAT	0.285[c]	0.285[c]	0.175[b]	0.186[c]	0.652[c]	0.637[c]
	(4.53)	(4.69)	(2.51)	(2.76)	(12.08)	(12.79)
NURS	-0.028	-0.039			-0.037[a]	-0.041[b]
	(1.10)	(1.63)			(1.71)	(2.04)
PROP	-0.215[c]	-0.188[c]	-0.136[c]	-0.111[b]	-0.161[c]	-0.160[c]
	(4.81)	(4.43)	(2.59)	(2.15)	(4.18)	(4.39)
GOV		0.033	0.137[c]	0.144[c]	0.101[c]	0.113[c]
		(0.98)	(3.25)	(3.50)	(3.27)	(3.87)
CATH	-0.056[b]	-0.054[b]			-0.035	-0.031
	(2.08)	(2.08)			(1.51)	(1.41)
MED	0.139[c]	0.139[c]	0.108[c]	0.101[c]	0.146[c]	0.150[c]
	(4.78)	(4.97)	(3.28)	(3.18)	(5.75)	(6.26)
MASS	0.131[b]	0.063	0.155[b]	0.172[c]	0.062[a]	0.091[c]
	(2.52)	(1.62)	(2.52)	(5.46)	(1.88)	(3.03)
MD	0.208[c]	0.154[c]	0.191[c]	0.126[c]	0.182[c]	0.115[c]
	(5.14)	(3.93)	(4.13)	(2.79)	(5.17)	(3.37)
NYC	0.156[b]		0.129[a]			
	(2.40)		(1.85)			
NYNNYC	0.198[c]	0.124[c]	0.204[c]	0.180[c]	0.026	
	(6.19)	(5.07)	(5.36)	(5.94)	(1.21)	
INDEX	0.724[c]	0.717[c]	0.957[c]	0.952[c]		
	(8.19)	(8.48)	(11.19)	(11.46)		
INDEXD					0.421[c]	0.389[c]
					(7.31)	(8.73)
HWI		0.512[c]		0.513[c]		0.430[c]
		(7.92)		(6.77)		(7.79)
UNION	0.032	0.033	0.040	0.057[b]	0.060[c]	0.058[c]
	(1.56)	(1.64)	(1.63)	(2.44)	(3.32)	(3.37)
CONSTANT	-1.157	-5.318	-0.033	1.542	-5.114	-3.600
R^2	0.956	0.960	0.653	0.668	0.638	0.670

*In this and subsequent tables two-tailed statistical significance levels for coefficients are indicated by the following notations: a - 0.10 level, b - 0.05 level, c - 0.01 level.

TABLE 4: REGRESSION RESULTS FOR 1971-75 CHANGES WITH UNIONIZATION DUMMY

Dep. Vble.	LEXD	LEXB	LEXBOIS	LEXBOIS	LEXBDAY	LEXBDAY
LHPOP			-0.196[c]	-0.102	-0.165[c]	-0.099[c]
			(2.95)	(1.62)	(5.31)	(2.84)
LMCAID					-0.032	-0.027
					(1.11)	(0.90)
LAGED	0.449[b]	0.423[b]			-0.372[b]	-0.482[c]
	(2.20)	(2.01)			(2.20)	(2.81)
LBDA	0.534[c]	0.536[c]	0.115[a]	0.134[b]		
	(16.77)	(15.19)	(1.69)	(1.99)		
LHSIZE			-1.360			
			(1.30)			
LDEN	0.518[c]	0.561[c]	0.348[b]	0.268		
	(2.84)	(2.97)	(2.29)	(1.15)		
LPHYSPOP			-0.064		-0.105[a]	-0.087
			(1.47)		(1.90)	(1.52)
SURGRAT					0.143	
					(1.18)	
LGPPOP					0.085	0.092
					(1.57)	(1.63)
INSURI			-0.369[c]	-0.328[c]	-0.252[c]	-0.248[b]
			(3.65)	(3.18)	(2.70)	(2.57)
CBINSI	-0.326[b]	-0.309[a]				
	(2.09)	(1.93)				
PCINC	0.096	0.103	0.146	0.115	0.178[a]	0.189[a]
	(1.05)	(1.07)	(1.34)	(1.08)	(1.87)	(1.84)
LCOL			0.513[b]	0.649[c]	0.226	0.338
			(2.35)	(2.89)	(1.02)	(1.17)
LAVEW	-0.135	-0.164[a]		-0.102		-0.092
	(1.60)	(1.89)		(1.03)		(1.12)
ECFRAT	0.363[c]	0.371[c]	0.183[c]	0.200[c]	0.359[c]	0.387[c]
	(8.28)	(8.29)	(3.57)	(3.93)	(8.22)	(8.64)
NURS	-0.037[b]	-0.032[a]			-0.020	-0.026
	(2.19)	(1.86)			(1.19)	(1.52)
PROP	-0.147[c]	-0.146[c]	-0.107[c]	-0.107[c]	-0.057	-0.056
	(4.14)	(4.07)	(2.63)	(2.67)	(1.61)	(1.59)
GOV	-0.035	-0.032	-0.050			
	(1.23)	(1.05)	(1.57)			
CATH	-0.028	-0.024				
	(1.57)	(1.33)				
MED	0.037[b]	0.037[a]				
	(1.98)	(1.89)				
DRESIDNT					-0.030[a]	-0.03[a]
					(1.74)	(1.81)
MASS	0.032[a]	0.035[a]			-0.069[b]	-0.053[b]
	(1.70)	(1.84)			(2.45)	(2.03)
MD	0.062[b]	0.059[b]			-0.048	-0.032
	(2.50)	(2.26)			(1.58)	(1.06)
NYC	0.063[a]	0.067[a]			-0.144[c]	-0.139[c]
	(1.74)	(1.77)			(3.81)	(3.69)
NYNNYC					-0.099[c]	-0.089[c]
					(4.42)	(4.14)
INDEX	0.233[c]	0.251[c]	0.155[b]	0.196[a]		
	(4.43)	(4.57)	(2.56)	(1.84)		
INDEXD						0.017
						(0.33)
HWI		-0.009		0.082		0.149[c]
		(0.16)		(1.16)		(2.91)
UNION	0.033[b]	0.032[b]	0.038[b]	0.033[a]	0.052[c]	0.050[c]
	(2.15)	(2.04)	(2.12)	(1.84)	(3.39)	(3.61)
CONSTANT	0.505	0.510	0.194	0.232	0.550	0.477
R^2	0.535	0.507	0.184	0.172	0.339	0.347

TABLE 5: UNIONIZATION RESULTS IN TOTAL COST REGRESSIONS

(t-statistics in parentheses)

	1975 Cross-Section (Dep. Vble. = LREA)						1971-75 Changes (Dep. Vble. = LEXB)					
DNATLUN	0.048 (1.30)	0.039 (1.05)	0.048 (1.49)	0.046 (1.22)	0.039 (1.02)		0.015 (0.46)	-0.010 (0.30)		0.006 (0.19)	-0.023 (0.65)	
TOTALUN	0.010 (0.61)	0.007 (0.40)		0.010 (0.59)	0.003 (0.20)		0.031 (1.53)	0.038[a] (1.85)	0.036[b] (2.32)	0.032 (1.56)	0.040[a] (1.92)	0.035[b] (2.28)
COV	0.305 (1.64)	0.334[a] (1.77)	0.321[a] (1.76)	-1.203 (1.37)	-1.916[b] (2.17)	-1.595[b] (2.15)	0.232 (1.42)	0.234 (1.23)	0.232 (1.43)	-0.654 (0.76)	-0.603 (0.66)	
DSV	-0.159 (1.60)	-0.179[a] (1.78)	-0.165[a] (1.70)	-0.160 (1.60)	-0.195[a] (1.93)	-0.181[a] (1.77)	-0.150[a] (1.66)	-0.135 (1.36)	-0.146[a] (1.66)	-0.173[a] (1.87)	-0.153 (1.51)	-0.176[b] (1.98)
DRN	-0.121 (1.61)	-0.138[a] (1.82)	-0.124[a] (1.68)	-0.120 (1.57)	-0.144[a] (1.87)	-0.153[b] (2.02)	-0.074 (1.16)	-0.085 (1.25)	-0.081 (1.29)	-0.088 (1.35)	-0.104 (1.49)	-0.100 (1.60)
UN71	-0.018 (0.51)	-0.004 (0.12)		-0.024 (0.68)	-0.009 (0.25)							
UN74	-0.037 (0.78)	-0.019 (0.39)		-0.036 (0.74)	-0.011 (0.23)		-0.053[a] (1.85)	-0.062[b] (2.15)	-0.050[a] (1.79)	-0.051[a] (1.79)	-0.060[b] (2.06)	-0.051[a] (1.82)
CBINS1 x COV				0.355[a] (1.74)	0.534[c] (2.59)	0.464[c] (2.76)				0.220 (1.08)	0.209 (0.96)	0.068[a] (1.78)
NYC x COV				-0.129 (1.17)	-0.112 (1.16)					0.058 (0.48)	0.095 (0.76)	
(NYC + NYNNYC)x COV				0.019 (0.28)	0.008 (0.12)					-0.021 (0.37)	-0.029 (0.51)	
HWI Included	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
R^2	0.957	0.956	0.957	0.957	0.956	0.952	0.546	0.520	0.545	0.549	0.524	0.547

TABLE 6: UNIONIZATION RESULTS IN COST-PER-CASE REGRESSIONS

(t-statistics in parentheses)

	1975 Cross-Section (Dep. Vble. = LREADIS)						1971-75 Changes (Dep. Vble. = LEXBDIS)					
DNATLUN	0.064 (1.47)	0.058 (1.37)	0.058 (1.54)	0.069 (1.55)	0.071 (1.63)		0.003 (0.10)	0.009 (0.23)		-0.019 (0.48)	-0.008 (0.28)	
TOTALUN	0.012 (0.61)	0.010 (0.53)		0.013 (0.64)	0.006 (0.33)		0.048[b] (2.00)	0.030 (1.26)	0.042[b] (2.44)	0.046[a] (1.95)	0.028 (1.18)	0.047[c] (2.65)
COV	0.611[c] (2.80)	0.632[c] (2.97)	0.638[c] (2.98)	-1.981[a] (1.91)	-1.972[b] (1.98)	-1.935[a] (1.88)	0.338[a] (1.73)	0.272 (1.34)	0.329[a] (1.76)	-0.666 (0.67)	-0.708 (0.68)	
DSV	-0.367[c] (3.15)	-0.360[c] (3.18)	-0.386[c] (3.37)	-0.360[c] (3.08)	-0.365[c] (3.20)	-0.389[c] (3.41)	-0.203[a] (1.88)	-0.150 (1.31)	-0.191[a] (1.88)	-0.244[b] (2.28)	-0.173 (1.50)	-0.229[b] (2.22)
DRN	-0.138 (1.56)	-0.146[a] (1.70)	-0.152[a] (1.75)	-0.128 (1.44)	-0.139 (1.61)	-0.181[b] (2.15)	-0.133[a] (1.73)	-0.105 (1.34)	-0.132[a] (1.81)	-0.160[b] (2.12)	-0.118 (1.49)	-0.149[b] (2.05)
UN71	-0.047 (1.17)	-0.047 (1.19)		-0.063 (1.53)	-0.055 (1.39)							
UN74	-0.120[b] (2.13)	-0.101[a] (1.83)	-0.094[a] (1.85)	-0.114[b] (2.01)	-0.089 (1.61)	-0.071 (1.40)	-0.038 (1.13)	-0.053 (1.56)		-0.042 (1.27)	-0.046 (1.36)	-0.046 (1.41)
CBINS1 x COV				0.598[b] (2.49)	0.599[b] (2.58)	0.621[c] (2.61)				0.267 (1.13)	0.251 (1.01)	0.092[b] (2.09)
NYC x COV				-0.270[b] (2.09)	-0.131 (1.26)	-0.214[a] (1.76)				0.086 (0.69)	0.106 (0.31)	
(NYC + NYNNYC) x COV				0.073 (0.95)	0.093 (1.24)					-0.099 (1.59)	-0.083 (1.32)	
HW1 Included	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
R^2	0.663	0.678	0.662	0.668	0.682	0.665	0.172	0.174	0.205	0.217	0.196	0.211

TABLE 7: UNIONIZATION RESULTS IN COST-PER-DAY REGRESSIONS

(t-statistics in parentheses)

	1975 Cross-Section (Dep. Vble. = LREADAY)						1971-75 Changes (Dep. Vble. = LEXRDAY)					
DNATLUN	0.067[b] (2.10)	0.061[b] (1.98)	0.086[c] (3.14)	0.068[b] (2.08)	0.060[a] (1.92)	0.076[c] (2.73)	-0.025 (0.76)	-0.018 (0.55)		-0.033 (0.99)	-0.032 (0.92)	
TOTALUN	0.016 (1.14)	0.012 (0.86)		0.013 (0.91)	0.013 (0.97)		0.056[c] (2.82)	0.044[b] (2.26)	0.046[c] (3.01)	0.050[b] (2.48)	0.039[b] (1.96)	0.032[b] (2.03)
COV	0.296[a] (1.85)	0.347[b] (2.26)	0.135[b] (2.37)	-1.545[b] (2.05)	-1.706[b] (2.37)	-1.530[b] (2.04)	0.472[c] (2.95)	0.367[b] (2.15)	0.483[c] (3.04)	0.474 (0.57)	0.463 (0.53)	0.551[c] (3.29)
DSV	-0.179[b] (2.10)	-0.203[b] (2.47)	-0.104[b] (2.11)	-0.198[b] (2.30)	-0.202[b] (2.46)	-0.211[b] (2.51)	-0.249[c] (2.79)	-0.174[a] (1.80)	-0.264[c] (3.04)	-0.280[c] (3.08)	-0.205[b] (2.09)	-0.287[c] (3.25)
DRN	-0.089 (1.38)	-0.106[a] (1.71)		-0.099 (1.52)	-0.099 (1.60)	-0.097 (1.54)	-0.177[c] (2.81)	-0.134[b] (2.05)	-0.168[c] (2.72)	-0.194[c] (3.04)	-0.158[b] (2.36)	-0.180[c] (2.90)
UN71	-0.011 (0.37)	-0.009 (0.32)		-0.014 (0.45)	-0.018 (0.62)							
UN74	-0.071[a] (1.71)	-0.056 (1.42)	-0.068[a] (1.81)	-0.069[a] (1.65)	-0.055 (1.39)	-0.063[a] (1.66)	-0.046 (1.63)	-0.050[a] (1.78)	-0.047[a] (1.69)	-0.040 (1.41)	-0.044 (1.54)	
CBINS1 x COV				0.443[b] (2.53)	0.480[c] (2.85)	0.444[b] (2.56)				0.022 (0.10)	0.002 (0.01)	
NYC x COV				-0.129 (1.59)	-0.233[c] (3.04)	-0.128[a] (1.73)				0.162 (1.36)	0.163 (1.34)	0.176[a] (1.73)
(NYC + MYNNYC) x COV				-0.007 (0.14)	0.030 (0.59)					-0.091 (1.62)	-0.102[a] (1.80)	-0.086 (1.57)
HW1 Included	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
R^2	0.649	0.679	0.647	0.650	0.680	0.649	0.372	0.371	0.372	0.379	0.377	0.375