DECLINING UNIONIZATION
IN CONSTRUCTION:
THE FACTS AND THE REASONS

Steven G. Allen

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ABSTRACT

This paper documents and examines the forces behind the decline of
unionization in the construction industry. The proportion of construction
workers belonging to unions has dropped from slightly less than one-half in
1966 to less than one-third in 1984. The employment share of union contractors
has declined even further because of the fraction of union members working in
the open shop rose from 29 to 46 percent between 1973 and 1981. Initially, an
important factor in the initial decline in percentage unionized was the growth
in the union-nonunion wage gap between 1967 and 1973. However, the gap did not
widen any further after 1973 and actually has narrowed substantially since
1978. A key subsequent factor has been the erosion of the productivity
advantage of union contractors, which dropped substantially between 1972 and
1977 and vanished by 1982. The decline of unionization is unrelated to changes
in worker characteristics or changes in the mix and location of construction
activity.

Steven G. Allen
Department of Economics and Business
North Carolina State University
Box 8110
Raleigh, NC 27695-8110
(919) 737-3886
BITNET: NSALLEN @ TUCC

The share of nonagricultural workers belonging to unions has declined from 34 percent in 1954 to 19 percent in 1984. The reasons for this decline remain largely a matter of conjecture. Farber (1985) and Freeman and Medoff (1984) have found that some of the decline can be statistically attributed to structural changes in worker and job characteristics, such as the growth of the service sector and the rise in the proportion of female workers. Another reason, pointed out by Freeman and Medoff, Freeman (1985) and Dickens and Leonard (1985), is that the percentage of nonunion workers who are organized through NLRB elections has dropped substantially. These studies indicate that, if unions become no more successful in organizing new workers than they have been over the last ten years, percentage unionized will continue to decline asymptotically to a level of between 10 and 15 percent.

As the authors of all of these studies recognize, such explanations raise as many questions as they answer. The structural change argument cannot address the question of why the share of union workers has changed within particular groups of workers. In particular, it cannot explain why unionization has been falling in manufacturing and construction and why it has been rising in the public sector. This argument also cannot deal with the possibility that the structural changes are not exogenous. One reason behind the declining share of the manufacturing sector and the rising share of the service sector could very well be the lower profit rates among establishments covered by collective bargaining agreements.

The organizing success argument is more illuminating as it pinpoints a major source of the decline in unionism within particular sectors. However, research in this area has not progressed far enough to explain why union organizing campaigns are bearing so little fruit. Some have attributed this to increased managerial opposition, as indicated by the rising number of employer unfair labor practices. It is not yet clear whether this increased opposition results

from changed perceptions of the cost of being unionized or from increased odds of preventing unionization. The declining success of union organizing efforts may also be attributable to incentives within the unions themselves that seem to put a high premium on providing services to the current membership and a low premium on organizing new members. Another possibility is reduced demand by workers for union coverage, a possible consequence of changes in nonunion personnel practices, increased government regulation of the work place, or a drop in the perceived economic gains from union coverage. Regardless of the reasons for the slowdown in union organizing, this argument cannot account for changes in unionization in sectors of the economy where NLRB elections have little or no role to play in union organizing or changes resulting from union-nonunion differences in the growth of employment across establishments.

This paper represents a first attempt to bring the economic forces behind both the structural change and organizing success arguments to the forefront in explaining changes in percentage unionized over time. The focus is on a single sector of the economy--the construction industry. In addition to building on my earlier work in this area, this has three distinct methodological advantages. First, most of the structural change factors likely to contaminate a broader analysis are removed. The labor force has remained fairly homogeneous (males in mostly skilled occupations) over the period examined. Even though there have been some major changes in the mix and location of construction activity, it will be shown below that they have had no impact on unionization. Second, short job durations make NLRB elections largely irrelevant to union organizing efforts in construction, thus eliminating to a great extent the impact of legal factors. Third, it is quite unlikely there is a single all-purpose explanation of the decline in percentage unionized that applies to all sectors of the economy. Instead, the answer is likely to vary, depending on such factors as government

regulation, import competition, and the structure of collective bargaining. Focusing on specific sectors is likely to lead to a richer and more accurate explanation of unionism's decline. Although the results of this study may very well be specific to construction, the procedures used here can be applied easily to other industries.

The results reported below are to be interpreted in terms of the following simple theoretical model. The union unilaterally sets the wage for work covered by collective bargaining agreements. The wage maximizes the union's objective function subject to the constraints outlined below. Analytically, this assumption eliminates the bargaining process itself from the model. In addition, it serves as a fairly close approximation to reality in the construction industry, as acknowledged by both critics of the building trades (Northrup (1984)) and more sympathetic observers (Mills (1972)). Given the union wage, contractors determine whether it is more profitable to hire union or nonunion labor. This decision hinges on expected wage and productivity differences between union and nonunion labor for each particular contractor. These differences are likely to vary with such factors as project size, location, and type of construction. Contractors who used union labor in the previous period must also take into account costs associated with switching to nonunion labor. These are similar to the fixed costs of union avoidance in Lazear (1983). In practice they may represent the legal costs of establishing a separate nonunion subsidiary (referred to as "going double-breasted") or the risk of strikes or violence. The initial distribution of union status is assumed exogenous.

Once the union wage and the number of establishments in the union sector have been set, union employment is demand-determined. Employment will be less than the number of union members unless full employment for its membership is the only objective of the union (in which case unions are unlikely to exist). Union

members who do not get jobs covered by collective bargaining agreements either work for nonunion contractors or drop out of the labor force. The market for nonunion labor operates in textbook fashion, conditional on the union wage.

In this simple model, declines in unionization result whenever the profitability of operating under collective bargaining agreements falls. This will happen when (1) the union-nonunion wage gap increases, (2) the union-nonunion productivity gap decreases, or (3) the cost of switching from union to nonunion construction decreases. Lacking any information on the last factor, the focus here will be on changes in wage and productivity gaps. Before looking at that evidence, I begin with the facts on trends in the share of construction employees who say they are union members, focusing on data for the last twenty years which have not been reported together previously. I also present the first set of estimates of the percentage of union members working in nonunion construction.

I. The Facts on Unionization in Construction

Everyone affiliated with the construction industry knows that the market share of union contractors has declined substantially over the last twenty years. There is little consensus on the magnitude of the decline or the current market share. For instance Robert Georgine, president of the Building and Construction Trades Department of the AFL-CIO, claimed in 1981, "The percentage of unionized construction is much higher than the 40% everyone talks about and is higher than 50%" (Engineering News-Record, Nov. 5, 1981). On the other hand, the Associated Builders and Contractors (ABC), an open shop trade association, claimed a 20 percent market share for the open shop in 1969, a 30 percent share in 1973, and a 65 percent share in 1983.   To get a more accurate picture of the magnitude and the timing of the growth of the open shop, the percentage of

workers belonging to unions or covered by collective bargaining agreements for various years between 1966 and 1984 is compiled in Table 1. A continuous source of this information is the May Current Population Survey (CPS) public use tapes for 1973 through 1981. Union membership status can also be ascertained for 1966 in the 1967 Survey of Economic Opportunity (SEO) and for 1970 in the March 1971 CPS. Coverage by collective bargaining agreements for all construction contractors in the Expenditures for Employee Compensation (EEC) Surveys for 1968-72 were compiled by Freeman and Medoff (1979). These are supplemented in Table 1 with results from special reports released by BLS between 1966 and 1971 on each two-digit construction industry. A question on collective bargaining coverage is also available on the CPS since 1978. All of the data in Table 1 are compiled from published sources except the May 1973-81 and 1983 CPS, which I computed using CPS sampling weights to make them comparable to the published data.

The best series for making long-run comparisons is the union membership data for all occupations. Between 1966 and 1973, there was little change in unionization. Percentage unionized actually grew by 0.5 percentage points between 1966 and 1970, followed by a 2.5 percentage point drop between 1970 and 1973. The evidence for construction workers (the term used by BLS to describe blue collar workers in construction) over this period is more difficult to use for comparisons over time, as the 1966 data exclude females and the 1970 data include government workers. Union membership rates are lower for each of these groups than for the rest of the sample. Patterns in the 1973-75 micro data indicate that the construction worker estimate for 1966 is 0.2 percentage points too high and the estimate for 1970 is 1.4 percentage points too low. Given these adjustments, the data on unionization for construction workers follow the same

pattern as the data for all occupations--no change between 1966 and 1970, and a small drop between 1970 and 1973.

The EEC data on collective bargaining coverage cannot be used to analyze trends in the share of union contractors, but it is a useful independent source of information on the size of the union sector in the late 1960s and early 1970s. The estimates of collective bargaining coverage are much larger than those for union membership in the same period. This is attributable to right to work laws and the EEC questionnaire (which asks if a majority of an establishment's production workers are covered by collective bargaining rather than for the percentage covered). Whereas the exact influence of each of these factors cannot be determined, the coverage estimates suggest that the employment share of the union sector was between 50 and 55 percent of all construction workers during this period. This is well within the range of estimates reported by Lewis (1963, p. 250) for various years between 1939 and 1960, suggesting that the unionized share of construction labor markets was quite stable until the early 1970s.

The employment share of the union sector continued to decline at a moderate pace between 1973 and 1977. The percentage for workers in all occupations dropped by 3.7 points; construction workers, 3.1 points.

The big drops in the employment share for the union sector took place in 1977-78 and after 1981. The percentage of workers in all occupations who were union members fell by 3.8 percentage points between May 1977 and 1978. It fell by 4.5 percentage points for construction workers. Percentage unionized stayed at this level in 1979 and 1980. The 1981 data indicate a 2 percentage point gain in the employment share for all occupations and a 1.6 percentage point gain for construction workers. These gains were wiped out within the next two years. Between May 1981 and 1983 the union share for all occupations fell by 4.6 percentage points. It dropped 4.0 percentage points in 1984 and another 1.2

points in 1985. As a result, between 1966 and 1986 percentage union plummeted

19.4 percentage points, a 47 percent decline. Almost all of this decline took

place after 1973.

The collective bargaining coverage estimates computed from the CPS for 1978

through 1986 tell basically the same story as the union membership estimates--the

share of union contractors fell dramatically between 1981 and 1983. The gap

between the membership and coverage estimates seems also to have narrowed

considerably over this period.

In summary, the facts about the decline in percentage unionized are:

1.   The union sector never dominated the construction industry to the
      extent that its stoutest proponents and harshest critics have
      maintained. In the late 1960s and early 1970s the employment share of
      unionized contractors was about 50 to 55 percent of all construction
      workers, roughly the same as it has been since 1939.

2.   A gradual decline in percentage unionized began after 1970 and
      continued through 1977. Over this period the proportion of union
      workers declined by 5 to 6 percentage points.

3.   The sharpest drops in the proportion of union workers took place
      between May 1977 and May 1978 and between May 1981 and 1985. Whereas
      more than one of three employees in construction belonged to unions in
      1977, less than one of four were union members in 1986.

Depressing as these figures may be for the building trades, there is even

more bad news. These calculations have ignored the supposedly growing proportion

of union members who work for nonunion contractors. Although this cannot be

documented as precisely as the proportion of workers belonging to unions, the

next section presents estimates of the importance of this factor.

II. Union Cards, Nonunion Jobs

To estimate the proportion of union members working in the nonunion sector,

data from quarterly BLS reports on union wage rates for building trades were

merged into the CPS public use files for 1973 through 1981. BLS reports wages

(and benefits) for six skilled occupations (bricklayers, carpenters,

electricians, painters, plasterers, and plumbers) and for building laborers for over one hundred cities. To make the merger of these data sets a manageable task and to impute union wages for those who do not work in those occupations or live in those cities, the following procedures were followed. Only the lowest wage in the six skilled occupations (usually painters) was merged into the CPS, along with the wage for laborers. For (1) persons living in SMSAs for which no BLS union wage data were reported, (2) those not living in SMSAs, and (3) those living in SMSAs not identified in the CPS, the lowest skilled wage and laborer wage across all SMSAs in their state (or region for persons whose state was not identified in the 1973-76 CPS) were merged into the CPS. In a few cases, union wage rates were unreported for laborers in a particular state. When this happened, operatives and laborers belonging to unions in that state were dropped from the sample.

The proportion of union members working at less than union rates was then calculated by comparing the self reported wage in the CPS to the union wage. The union wage for skilled workers was assigned to craftsmen; the union wage for laborers was assigned to operatives and laborers; half the union wage for skilled workers was assigned to apprentices.

Before presenting and discussing these estimates, a few comments about sources of bias and measurement error are in order. In making judgments about how to merge union wage rates into the CPS, the tendency was always to produce a downwardly biased estimate of the proportion of union members receiving nonunion wages. Workers in relatively high wage occupations, such as electricians and plumbers, always have their CPS wage compared to a union wage from a relatively low wage occupation. The union wage data are reported for July of the previous year. This was done to offset variation across SMSAs in the timing of contract

negotiations and variable lags across SMSAs in reporting new agreements in the seemingly more appropriate April survey.

These judgments were intended to offset three potentially important and unavoidable sources of upward bias. The first is reporting errors in union status. Some nonunion workers will be mistakenly identified as union members, and in most cases will be receiving wages below union scale. The other two important sources arise from the lack of detail in the BLS union wage data. In some areas lower wage rates are paid for skilled occupations in certain types of construction, especially residential work. These are not reported by BLS and, even if they were, could not be merged into the CPS because it does not report type of construction. The other problem is that workers in some excluded occupations, such as floor layers and terrazzo workers, have lower union wage scales than workers in the six occupations reported by BLS.

There are two additional sources of pure measurement error: errors in reporting wages in the CPS and exclusion from the BLS union wage data of smaller SMSAs and rural areas. Although the latter may seem at first glance to be a source of upward bias, the use of multicounty and statewide bargaining units in many states means that rates in rural areas can be equal to or near the highest rates in that state. Even if the very lowest union rates in each state may not be observed, assigning them to all rural workers would introduce additional downward bias, the magnitude of which cannot be determined. As it turns out, the proportion of union members receiving wages below union scale is lower in rural areas and smaller SMSAs than in the larger SMSAs identified in the CPS in eight out of the nine years in the sample.

The magnitude of these biases (in percentage points) is assessed in detail in the appendix and summarized below:

1. Sources of upward bias
   A. Errors in reporting union status   7.5
   B. Lower rates in residential or other
      types of construction   6.1
   C. Trades with lowest wages excluded
      from BLS   1.8
   D. Total   15.4
2. Sources of downward bias
   A. Union wage computed from lowest
      wage occupation   -7.4
   B. Union wage as of July 1 of previous
      year   -7.9
   C. Total   -15.3
3. Total bias   0.1

These adjustment factors show that the estimates of the ratio of union members

working in the open shop are likely to be very close to the mark.

The results in Table 2 show that in 1973 almost three of every ten union

members were working in the open shop. This proportion rose to 35 percent in

1979 and 1980, and rose dramatically again in 1981 to 46 percent. These

estimates suggest demand conditions play a strong role in determining whether

union members get jobs in the union sector. The proportion working in the open

shop rose during both the 1975 and 1979-81 downturns in construction activity.

Union members in the Northeast and Midwest are most likely to be working in the

open shop.

How sensitive are these estimates to the procedures used in deriving them?

One way of determining this is to use 80, 90 or 110 percent of the imputed union

wage as the basis for comparison to the CPS wage. This produced the following

results for 1973-78 combined:

Percentage of imputed union wage from BLS	Percentage of union members working in open shop
80	13.3
90	19.9
100	29.3
110	44.2

The estimate is clearly quite sensitive to the definition of the union wage. However, even the smallest estimates show that a substantial proportion of union members are not being paid union scale.

Once adjustments are made for proportion working in the nonunion sector the decline in unionization becomes larger in both absolute and relative terms. Instead of the 5.4 percentage point and 12 percent proportional drop between 1973 and 1981 observed for union membership, there is now a 10.4 percentage point and a 33 percent proportional drop in the share of workers who are union members and are receiving union wages. As these calculations ignore the phenomenon of nonunion workers covered by collective bargaining agreements, the true employment share of union contractors is underestimated, although it is doubtful that this has much effect on the trend.

These figures provide a reasonably accurate picture of the market share for union members. They have lost so much of the market to the open shop over the last ten years that if this trend continues another five to ten years, they will no longer be a significant factor in construction labor markets.

III. Structural Changes Within Construction

One possible set of reasons for the decline in percentage unionized in construction is changes in worker characteristics and changes in the mix and location of construction projects. For instance, today workers are younger, craftsman represent a smaller share of employment, and a higher proportion of workers are women than ten years ago. All these factors would lead to lower levels of unionization. There also have been important changes in the structure of the industry. The Northeast now accounts for a smaller share of total construction than it did ten years ago. Because of the Davis-Bacon Act and prevailing wage laws covering construction for state and local governments, union

contractors have always been able to capture a large proportion of the construction work done for governments. Government construction expenditures have grown much less rapidly than private sector expenditures, so this could also be an important factor in the decline of unionism in the industry. Although there have been factors acting in the opposite direction to increase unionization, such as a more educated work force and a rising share of construction in the Pacific division, it is still possible that much of the decrease in percentage unionized is attributable to such "exogenous" factors.

To examine this possibility further, Table 3 reports annual estimates from the CPS of the percentage of workers belonging to unions between 1973 and 1981 by by region. There were 20 to 30 percent declines in unionization in every region except the Midwest, where proportion unionized stayed at roughly the same level throughout most of the period. This makes it unlikely that regional shifts can explain much of the decline in unionism over this period.

To expand the scope of the analysis beyond regional shifts, a linear probability model of union membership was estimated over the 1973-1978 CPS. The sample includes all occupational categories to account for trends in the use of union foremen. The independent variables include age and its square; years of schooling; dummy variables for occupation (8), two-digit industry (3), Census division (8), race (2), sex, marital status (1), year (5), and SMSA status (2); and the proportions of construction activity in each state of government, maintenance and repair, single family home, apartment, retail, educational, hospital, heavy, industrial, office, and highway construction. These market share variables are included because percentage unionized varies greatly across different types of construction. Their coefficients should indicate how variation in the type of construction affects unionization. To evaluate the impact of changes in worker characteristics and changes in the mix and location

of construction projects, the difference in the mean of each independent variable between 1973 and 1981 (1972 and 1982 for the mix of construction variables) was multiplied by its coefficient. The sum of these products represents the predicted change in fraction unionized over this period.

The results (summarized in Table 4 and reported in complete detail in Appendix Table A) show that only two sets of "exogenous" factors contributed at all to the decline in proportion unionized. Substitution of white collar for blue collar labor resulted in a decline of 2.4 percentage points, and smaller proportions of male and married workers resulted in a decline of 0.8 percentage points. When all of the other factors--changes in labor quality, two-digit industry, location and mix of construction--are taken into account, the model predicts an increase of 2.6 percentage points in unionization. The reason for the predicted increase is the 3.4 percentage point growth associated with changes in the mix of construction, arising largely from the increased share of maintenance and repair work. Because of the dubious magnitude of some of the coefficients of the mix of construction variables, the model was also estimated without them. The coefficients for the remaining variables changed very little. The new model predicts a 1.1 percentage point decline in unionization, which is very close to the prediction one would derive from Table 4 by ignoring the type of construction variables.

The key point of this analysis is that the structural hypothesis is incapable of explaining the decline in unionization between 1973 and 1981. Across all occupations, percentage unionized fell by 6.6 points. The models predict either a 1.1 point drop or a 2.6 point increase. No more than 17 percent (1.1 6.6) of the decline in unionization can be explained in terms of exogenous factors. This explanation is unsatisfactory not only on statistical grounds but

also because it relies upon the dubious assumption that unions did not cause the most important "exogenous" factor -- substitution of white for blue collar labor.

IV. Changes in the Union-Nonunion Wage Gap

Wage cuts and freezes have become commonplace in the construction industry. For contracts signed in 1984, the average increase in wages over the life of the contract was lower (1.0 percent) in construction than in any other major sector of the economy. The most frequently stated rationale for these wage adjustments is that they are necessary to preserve jobs in the union sector. This belief is based on the premise that union wage rates grew so rapidly in the late 1960s and the 1970s that the building trades in effect priced themselves out of the market.

To examine this possibility, wage gap estimates for private wage and salary workers were obtained from the May 1973-1981 and 1983 CPS using a variety of specifications. The basic model regresses the log of the wage (or average hourly earnings for those who are not paid by the hour) on age and its square, schooling, and dummies for union membership, occupation, industry, region, race, sex, marital status, and SMSA residence. It was estimated across all occupations as well as across construction workers only. These estimates are supplemented in Table 5 with estimates from Ashenfelter (1978) for 1967 from the SEO and 1973 and 1975 from the CPS. His model contains interaction terms with occupation, industry, and union status in a model estimated across all occupations and industries. Inclusion of Ashenfelter's 1973 and 1975 estimates is necessary to make accurate comparisons of the wage gap between 1967 and later years.

Ashenfelter's results show that the wage gap grew from 37.7 to 53.7 percent between 1967 and 1973, and stayed at 53.7 percent in 1975. The wage gap estimates in 1973 and 1975 are slightly higher (see column 4) when the equation is estimated over a more restricted sample than Ashenfelter's (construction

workers) in a specification without any interactions. In the years immediately

after 1975, there is no trend in the wage gap estimates. The gap widened

from 57 to 61 percent in 1976 and stayed at 60 percent in 1977 and 1978.

The main finding in Table 5 is that the wage gap actually got smaller after

1978. The gap fell to 43 percent in 1979 and remained no larger than 50 percent

in 1980, 1981 and 1983. The reasons for this drop are not yet clear. Mellow

(1982) reports similar drops in the wage gap in 1979 for all workers. One

possible reason could be differences between union and nonunion wage

responsiveness to the business cycle or inflation. Regardless of the reason, it

is impossible to use this evidence to claim that the wage gap continued to widen

after the mid-1970s. The results for all construction occupations in column 2

show the same pattern--the wage gap was shrinking, not growing, in the late 1970s

and early 1980s.

To examine the sensitivity of these results to the set of variables included

as controls, two additional specifications of the model were estimated: one from

which certain workers characteristics (age, schooling, race, sex, and marital

status) were dropped from the model and another from which all other control

variables (region, occupation, industry, and SMSA residence) were dropped. These

results are reported in columns 5 and 6 of Table 5. They show exactly the same

pattern as the wage gap estimates obtained when holding these factors constant.

All of these estimates are based on the assumptions that no union members

work for nonunion contractors and no nonunion workers are employed by union

contractors. Collective bargaining coverage is reported by nonunion workers in

the 1978-1981 and 1983 CPS, allowing the construction of a new union variable

equal to one if the respondent is either a union member or works on a job covered

by collective bargaining. The coefficients for this new variable in column 7 are

about the same as those for the union membership variable over this period. To

examine the impact of the second assumption, another union variable was created to be equal to one if the respondent was a union member and was receiving a wage at or above union scale. Results for this variable in column 8 show a sustained increase in the wage gap through 1977. However, after 1977 this set of wage gap estimates also falls to values that are no greater than those for 1973.

Another way to shed further light on this question is to estimate separate models for each of the four major regions of the United States. Table 3 showed that the decline in percentage unionized was concentrated in the Northeast, South, and West; the decline in the Midwest was much more modest. Accordingly, if growth in the wage gap has been an important cause of the decline in unionism in construction, the wage gap should either be growing less rapidly or shrinking in the Midwest relative to the other three regions.

Because of the decreased size of the data sets, the wage gap estimates by region in Table 6 show greater year-to-year variability than those in Table 5. To make comparisons over time within each region, the means for 1973-75 and 1980-83 are used rather than the values within each year. These results show that the proportional reduction in the wage gap was greatest in the Northeast. In 1973-75 the wage gap was largest in the Northeast; by 1979-81 it was smallest. However, this cut in the wage gap did not prevent percentage unionized in the Northeast from declining by a substantial amount. The wage gap changes are roughly the same in the Midwest and West despite large differences in the trend of unionization. Percentage unionized dropped by 12 points in the West; it declined very little in the Midwest. This evidence makes it even more difficult to believe that the decline in percentage unionized since 1973 was caused by a widening wage gap.

The above evidence ignores a potentially important source of labor cost differences between union and nonunion contractors--employee benefits. Voluntary

benefits became a rising share of total compensation in the union sector between 1970 and 1980, rising from 11.5 percent of compensation (excluding mandatory benefits) to 18.8 percent. As a result, wages and voluntary benefits under collective bargaining increased at an 8.0 percent average annual rate in the 1970s, in contrast to the 7.1 percent rate for wages. Almost all of the growth in benefits took place between 1970 and 1977.

The impact of this growth in union benefits on the union-nonunion compensation gap cannot be determined because there are no benefit data for the nonunion sector. Even if benefits are nonexistent in the open shop, the growth in union benefits only partially offsets, rather than overrides, the impact of the post-1978 wage gap reduction on the compensation gap, as shown below:

Year	(1) Union wage, journeymen (from BLS)	(2) Union-nonunion wage ration (from Table 11, col. 4)	(3) Estimated nonunion wage (1) (2)	(4) Union wage plus voluntary benefits (from BLS)	(5) Union-nonunion compensation gap (4) (3)
1973	7.62	1.600	4.76	8.83	1.854
1974	8.14	1.555	5.25	9.59	1.826
1975	8.88	1.574	5.64	10.56	1.872
1976	9.48	1.611	5.88	11.43	1.942
1977	10.02	1.603	6.25	12.28	2.091
1978	10.61	1.595	6.65	13.07	1.965
1979	11.32	1.432	7.90	13.98	1.768
1980	12.21	1.504	8.12	15.05	1.854

V. Changes in the Union-Nonunion Productivity Gap

Evidence in the early 1970s from both micro data on buildings in Allen (1986) and state by industry aggregates in Allen (1984) shows that productivity for union contractors is higher than productivity for nonunion contractors. This productivity gap has been shown by Allen (1987) to be large enough in some cases to offset the wage gap, making union contractors competitive in terms of unit cost.

Studies in other industries have shown that productivity gaps can change considerably over fairly short periods of time. Freeman and Medoff report work by Jonathan Leonard showing the productivity gap in manufacturing widened from 10 to 31 percent between 1972 and 1977. The productivity gap in bituminous coal moved in the opposite direction. Connerton, Freeman, and Medoff (1983) find a 33 to 38 percent higher productivity in union mines in 1965. This advantage evaporated by 1970 and turned into a productivity advantage for nonunion mines of about 15 to 20 percent in 1975 and 1980.

To determine whether similar changes have taken place in construction, the 1977 and 1982 Census of Construction Industries (CCI) were used to replicate the results on state by two-digit industry aggregates in Allen (1984). Because individual states are identified in the CPS starting in 1977, there are now 153 observations, one for each state, instead of the 81 observations used for the 1972 sample. Percentage unionized is obtained from the May 1977-78 CPS for the 1977 CCI and the May 1979-1981 CPS for the 1982 CCI. Wage equations estimated by sex for nonunion workers were used to compute a labor quality variable for each state by industry cell as in Allen (1984). The capital-labor ratio and employees per establishment come from CCI. There is no control for the recentness of the capital stock because net capital is not reported in the 1977 and 1982 CCI. Exclusion of this variable from the model for the 1972 sample had no effect on

the key results, so it is quite unlikely that the absence of this variable will make comparisons between 1972, 1977, and 1982 misleading. The model also includes dummies for two-digit industry (2) and region (8).

Two dependent variables are examined: value added per employee and value added deflated by the Dodge Cost Index per employee. Because of the heavy weight given to wage rates in the Dodge Index, there is a strong likelihood that the deflated specification will produce a downwardly biased union coefficient. The opposite bias is present in the undeflated specification to the extent that the cost of higher union wage rates is passed on to owners of construction projects in the form of higher prices rather than being absorbed by contractors in the form of lower profits. While these biases make it difficult to infer the true impact of unions on productivity from cross section data, they are irrelevant for the purpose of examining the change in the impact of unions on productivity over time. The same bias will be present in each specification in each year, making the difference in the union coefficients between years in a given specification an unbiased indicator of the change in the productivity gap.

The union coefficients in both specifications in Table 7 fall substantially between 1972 and 1982. Value added per employee was 39 percent higher in the union sector in 1972, but only 21 percent higher in 1977 and 24 percent higher in 1982. In the deflated specification, the productivity gap estimate falls from 17 percent in 1971 to 8 percent in 1977 and 6 percent in 1982. The latter two estimates are smaller than their standard errors. The decline in the union coefficient between 1972 and 1982 is similar in both cases: .110 in the undeflated specification and .099 in the deflated specifications.

A number of other specifications of the model were examined to test the sensitivity of this result. For instance, one possible explanation for the fall in the union coefficient is the difference in the levels of aggregation across

the two samples. Many states had to be combined into regions in the 1972 sample because they could not be identified in the 1973-75 CPS. If the coefficients vary across different states, this could account not only for the drop in the union coefficient but also for the changes in the capital-labor ratio, employees per establishment, and the labor quality coefficients. In addition, the CPS sample size for the smallest states may be so small in 1977-78 that there is more measurement error in the union and labor quality variables in the 1977 sample. Aggregation might then increase those coefficients.

To see if aggregation was responsible for the difference in the results, 1977 and 1982 data for certain states were aggregated by region in the same way as in the 1972 sample. This lowered the union coefficient (S.E.) in the 1977 sample to .148 (.080) in the undeflated specification and .051 (.076) in the deflated specification. In 1982 the union coefficient (S.E.) was .050 (.134) in the undeflated specification and -.011 (.119) in the deflated specification. All other key coefficients were essentially unchanged in both years. Differences in aggregation thus clearly are not responsible for the change in the union coefficient becomes even more pronounced when the same aggregation scheme is used in all three years. Results for 1982 indicate that the union-nonunion productivity gap has vanished.

Other aggregation methods that combined some of the smallest states (e.g., Vermont and New Hampshire) were also examined, but the basic results were unaffected. Other tests for sensitivity involving different controls for labor quality (average age and schooling instead of the predicted wage, no labor quality variable), different assumptions about the average lifetime of capital (10 or 20 years instead of 15) and a different union variable (collective bargaining coverage instead of union membership) were also conducted. All of

this evidence, available upon request, did not change the basic finding in Table 7--the union productivity gap vanished between 1972 and 1982.

What are the reasons for the drop in the productivity gap between 1972 and 1982? There is no evidence that the negative effects of unionism on productivity became more pronounced. Neither strike activity nor the percentages of workers covered by agreements limiting or prohibiting subcontracting, limiting or regulating crew size, or restricting work by nonbargaining unit personnel changed over this period. The main sources of the union productivity advantage in the early 1970s seem to have been better training, better management, and economies in recruiting and screening provided by the union hiring hall. Possible changes in these factors will be examined in more detail.

Except in a few large firms, there is no evidence of any change in training practices over this period in the open shop. Surveys by Northrup (1984) show that the share of open shop contractors relying mostly on informal on-the-job training has not changed. Even the Business Roundtable's 1983 report on construction industry productivity, usually critical of unionism, found fault with open shop training practices:

> Less than 10 percent of those individuals completing construction craft training programs are being trained in open shop programs. In spite of the estimate that open shop contractors now perform 60 percent of all construction work.
> Less than 10 percent of all funds currently spent in training construction craftsmen are directed toward open shop programs.
> If the open shop sector of construction remains at the present level without a significant increase in open shop training, there could be long-term deterioration in the quality and productivity of the construction work force.
> Only in a few areas of the country is open shop construction training conducted at a level commensurate with the growth of open shop construction activity.

There is only one reason to expect any increase in the average training of workers in the nonunion sector--the increased ratio of union members working in open shop jobs. The unionization variable in Table 7 is based on union

membership, not on the share of union members working at union wages. One way to

adjust for the rising percentage of union workers employed in the nonunion sector

is to add an interaction term to the model between the union membership variable

and the percentage of union members working at wages below union scale. This

allows the union coefficient to be a function of the proportion of union members

working in the open shop. One problem in implementing this approach is the small

number of union members in many state by industry cells, which would lead to

severe measurement error bias. To offset this, the proportion of union members

working in the open shop was calculated for each state rather than for each state

by industry cell. This proportion was included in the model directly along with

the interaction term.

When all three sample years are pooled, the coefficient (S.E.) of the

interaction term is -.394 (.148) in the deflated specification. Based on this

finding, the increase in the percentage of union members working for nonunion

wages between 1973 and 1981 would result in a decline of the union coefficient of

.066. This accounts for over half the decline in the union coefficient in Table

7.

This result is not as strong in other specifications. For instance, the

coefficient (S.E.) of the interaction term in the undeflated specification is a

much smaller -.225 (.170). Also, when proportion unionized is defined as the

share of construction workers in each state who are union members and are working

at union scale (and the interaction term and the ratio of union members working

in the open shop are dropped from the model), the union coefficient drops by more

than .3 between 1972 and 1982--a bigger decline than that reported in Table 7.

In summary, the increased proportion of union members working in the open

shop probably is partially responsible for the disappearance of the union

productivity advantage, but the lack of robustness in the results using this variable suggests that other forces are at work.

Another possible explanation of the disappearance of the union sector's productivity advantage is the increased experience open shop contractors have obtained in doing larger scale projects. The open shop initially was concentrated in residential and small commercial projects. Many open shop contractors got their first experience with larger projects in the late 1960s and early 1970s. If there is a learning curve in construction management, these contractors would have had much lower productivity initially than union contractors, even with access to the same skilled labor force. Eventually the productivity gap would narrow as nonunion contractors gained experience in larger projects. The validity of this argument cannot be tested empirically.

A final possible explanation of the gap's disappearance is that the search economies obtained from use of union hiring halls vanished in the face of high unemployment rates. Unemployment rates in the construction industry rose from 10.3 percent in 1972 to 12.7 percent in 1977 and 20.0 percent in 1982. The validity of this argument is also impossible to assess. The rise in unemployment between 1972 and 1977 does not seem to be large enough to account for the drop in the union coefficient over that period, but the massive unemployment observed in 1982 may have been enough to eliminate the search economies of hiring halls. Northrup's surveys indicate that the reliance of open shop contractors on informal contacts and advertising as hiring sources did not change over this period.

Regardless of the reasons for the decline in the productivity gap, it seems quite clear that it was a major factor behind the reduction in percentage unionized after 1973. Even though the wage gap did not change between 1973 and 1978, the reduced productivity gap gave owners and contractors tremendous

incentives to switch from union to nonunion labor. It also seems plausible that the reduction in the wage gap in 1979 and later years could have been a response to competitive pressures generated by the declining productivity gap.

VI. Conclusion

There are five major empirical findings in this paper:

1. The proportion of construction workers belonging to unions has declined from slightly less than one-half in 1966 to less than one-third in 1984. The decline seems to have started after 1970 and continued at a very gradual rate through 1977. The sharpest drops took place between May 1977 and May 1978 and between May 1981 and 1985.

2. The market share of union contractors has declined to an even greater extent than the percentage of union members because of the rising share of union members who work for nonunion contractors. This share grew from 29 to 46 percent between 1973 and 1981. While these estimates are highly sensitive to assumptions about union wage rates, they suggest that the market share of union contractors fell 10 percentage points between 1973 and 1981 and that only one out of five construction workers today is a union member working for a union contractor.

3. The decline of unionism in construction is unrelated to changes in worker characteristics and changes in the mix and location of construction activity.

4. An important factor behind the initial decline in percentage unionized is the growth in the union-nonunion wage gap between 1967 and 1973. However, the gap did not widen any further after 1973 and actually has narrowed substantially since 1978. Unless market adjustment lags are quite long, the declines in percentage unionized since 1973 must have been caused by some other factors.

5. A key factor is the erosion of the productivity advantage of union

contractors, which dropped substantially between 1972 and 1977 and vanished

by 1982. This most likely resulted from the rising share of union members

working for nonunion contractors and the impact of high unemployment rates on the

search economies associated with union hiring halls.

This paper has focused on two of the three forces predicted by the model to

determine levels of unionization. The third force--changes in the cost of

switching from union to nonunion construction--may also be quite important,

partly because of changes in pension regulations that make it quite expensive to

leave multiemployer pension plans, but mainly because of the growth in the

number of large union contractors that have gone double-breasted over the last

ten years. A crude estimate of the growth of double-breasting can be calculated

from Northrup's summary of the Engineering News - Record's annual tabulations of

the 400 largest construction firms. Out of 731 firms surveyed for 1975, 57 (7.8

percent) were double-breasted. By 1980, 73 (18.2 percent) of the top 400

contractors were double-breasted.

The reasons behind the growing share of double-breasted firms are not yet

clear. It may simply be a response to the changing wage and productivity gaps

described above. On the other hand, double-breasting can be viewed either as a

mechanism for diversification or as a legal innovation designed to meet the

letter, if not the spirit, of federal labor legislation. The open shop branch of

a double-breasted firm is supposed to be a separate concern, with its own

offices, management, and payroll. Unions have charged that in many cases these

distinctions are artificial and that the union contract legally applies to the

nonunion subsidiary. Legal outcomes depend on the evidence about the degree of

separation in operations between union and nonunion branches. It would be useful

in future work to examine this phenomenon more closely to see if double-breasting

has done for unionization in construction what employer unfair labor practices apparently have done to union organizing success in other industries.

The results of this paper show that economic forces have played a significant role in the decline of unionism in construction. Methodologically, they point to the need to examine both wage and productivity (or cost or profitability) evidence in analyzing the sources of changes in unionization over time. A key reason behind the decline in the productivity advantage of union contractors seems to be the rising share of union members working in the open shop. This study has not addressed the issue of why more union members are working in the open shop. It is quite rare to see an open shop contractor paying higher wages than union contractors. Although it is possible that some union members would seek nonunion jobs for other reasons (e.g. if they were dissatisfied with the union), the wage gap between union and nonunion jobs is so large that it is hard to believe that voluntary mobility has been a key factor. A stronger possibility is that the shortage of union jobs became more severe as high interest rates and severe recessions shifted the demand curve for union labor leftward in the late 1970s and 1980s. In response union members took nonunion jobs because they were the only jobs available.

The findings of this study have an important implication for the future of unionism in construction. Wage givebacks are not likely to help restore much of the market share lost in recent years to the open shop. The productivity advantage of union contractors has eroded to such a degree that the size of the wage cuts needed to restore a balance between the wage and productivity gaps is unlikely to be acceptable to rank and file. Instead, the focus of both union leaders and unionized contractors must be on rebuilding the union productivity advantage.

Appendix

   This appendix summarizes the methods used to estimate the magnitude of the sources of upward and downward bias in estimates of the percentage of union members working in the open shop in Section II:

1A. Freeman (1984) examined measurement error in union status by comparing employee and employer responses in the May 1977 CPS. He found that 7.5 percent of persons claiming to be covered by collective bargaining worked for employers who claimed they were not.

1B. The January 1981 Handbook of Wages and Benefits for Construction Unions published by the Department of Labor lists wages and estimated membership for most locals. The percentage of members covered by agreements offering less than the wage for building construction was calculated for five of the six skilled trades from which BLS union rates were taken as well as for laborers. The sixth skilled trade, plasterers, represented less than 1 percent of the CPS sample of union workers and was excluded for that reason. The results were as follows:

Bricklayers	2.9	Painters	2.1
Carpenters	5.0	Plumbers	1.1
Electricians	9.0	Laborers	10.6

The percentages for the five skilled trades were aggregated by their CPS union employment shares into a single estimate of the percentage of skilled trades workers covered by agreements offering lower rates than in building construction. The average of this latter estimate and that for laborers was 6.1 percent, using the CPS union shares of all craftsmen and all operatives and laborers as weights.

1C. The Handbook reports three skilled trades for which average rates were below those of painters, who receive the lowest average wages of any of the six skilled trades. Members of the locals of these three trades (floor layers, marble setters, and terrazzo workers) account for 1.8 percent of all skilled trades. No wage data were reported for workers in operative or unskilled occupations other than laborers (e.g., oilers), so the 1.8 percent estimate was assumed to apply there also.

2A. The imputed union wage rate for bricklayers, carpenters, cement masons, electricians, iron workers, operating engineers, plasterers, plumbers, roofers, and sheet metal workers was multiplied by the ratio of the average wage in that trade, as reported in the Handbook, to the average wage for painters. This adjusted union wage was then compared to the wage reported in the CPS to produce new estimates of the percentage working in the open shop. The results for 1973-1978 are:

Occupation	Original percentage in open shop	Adjusted percentage in open shop
Brick masons	26.2	32.0
Carpenters	28.4	31.4
Cement masons	41.7	44.4
Cranemen	25.0	38.9
Electricians	18.5	29.0
Excavating machine operators	34.6	46.3
Painters	40.9	40.9
Plasterers	25.8	25.8
Plumbers	19.5	29.9
Roofers	29.6	31.0
Sheet metal workers	12.3	33.6
Structural metal workers	12.8	21.0
Total, above occupations	25.7	33.1

The increase in share of union members working the open shop arising from this adjustment is 7.4 percentage points.

2B. The average change in wages from July 1 in the previous year to May 1 in the CPS survey year was estimated by prorating the monthly rate of change of average union wages between July 1 in the previous and July 1 of the current year to the shorter ten month period. The imputed union wage was then multiplied by the estimated July to May rate of change in wages to get a new wage to compare to that reported in the CPS. The results for 1973-1978 are:

Year	Original percentage in open shop	Adjusted percentage in open shop
1973	28.7	36.9
1974	27.9	34.9
1975	32.7	42.7
1976	28.7	36.7
1977	29.3	35.4
1978	28.9	37.7
Total	29.3	37.2

The increase in the share of union members working in the open shop arising from this adjustment is 7.9 percentage points.

Interactions between these different sources of bias have not been examined.

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Table 1. Percentage of private wage and salary workers in construction belonging to unions or covered by collective bargaining agreements, by occupation, 1966-1985

Year	Percentage union members		Percentage covered by collective bargaining agreements		Source
	All occupations	Construction workers	All occupations	Construction workers	
1966	41.4	47.3[a]			1967 SEO
1966				45	EEC, SIC 15
1969				61	EEC, SIC 17
1970	41.9	44.8[b]			March 1971 CPS
1971				53	EEC, SIC 16
1968-72			53	60	EEC, all SICs
1973	39.4	44.4			May 1973 CPS
1974	37.2	42.8			May 1974 CPS
1975	37.0	42.6			May 1975 CPS
1976	35.7	41.7			May 1976 CPS
1977	35.7	41.1			May 1977 CPS
1978	31.9	36.6	37.5	42.7	May 1978 CPS
1979	31.6	37.5	36.9	43.3	May 1979 CPS
1980	30.8	37.4	34.8	41.9	May 1980 CPS
1981	32.8	39.0	38.9	44.8	May 1981 CPS
1983	28.2	32.0	30.7	34.6	May 1983 CPS
1983	27.5		29.4		1983 CPS, all months
1984	23.5		24.8		1984 CPS, all months
1985	22.3		23.6		
1986	22.0		23.4		

[a]Females excluded
[b]Includes government wage and salary workers

Table 2. Estimates of union market share in construction, 1973-1981.

| Year | Percentage union members | Percentage of union construction workers receiving less than the union wage | | | | | Percentage who are union members and receive union wages |
		U.S.	Northeast	Midwest	South	West	
1973	44.4	28.9	32.2	32.1	28.3	22.5	31.6
1974	42.8	28.2	34.3	29.1	28.3	21.9	30.7
1975	42.6	33.1	37.4	39.9	36.2	15.4	28.5
1976	41.7	28.6	38.7	27.6	24.3	26.4	29.8
1977	41.1	29.0	40.9	27.1	31.8	21.0	29.2
1978	36.6	30.0	33.1	34.2	33.8	19.1	25.6
1979	37.5	34.9	49.9	35.5	24.8	29.5	24.4
1980	37.4	34.6	39.6	36.0	28.3	35.8	24.4
1981	39.0	45.6	52.7	48.4	40.6	40.2	21.2

Table 3. Percentage of private wage and salary workers in construction belonging to unions, by occupational group, region, and year.

Year	Northeast	Midwest	South	West
	All occupations			
1973	47.2	46.2	24.4	54.8
1974	44.4	47.1	21.7	54.2
1975	43.3	50.9	23.9	44.3
1976	42.2	44.8	23.4	44.6
1977	40.8	46.2	22.5	43.2
1978	37.1	42.6	17.8	42.3
1979	36.3	45.4	16.3	39.8
1980	34.1	45.0	18.1	37.5
1981	33.2	51.9	17.0	41.2
1983	36.3	40.3	17.1	30.3
	Construction workers			
1973	52.4	54.8	27.1	62.3
1974	50.9	54.4	25.2	62.8
1975	48.6	58.8	27.6	53.6
1976	48.1	53.6	26.8	54.9
1977	48.2	53.2	25.8	48.7
1978	45.2	49.0	20.5	47.6
1979	44.7	52.8	19.6	46.8
1980	41.8	54.3	21.5	47.8
1981	43.8	62.3	20.2	47.0
1983	39.2	51.5	18.9	33.6

Table 4. Decomposition of sources of change in unionization, 1973-1981

		Effect on percentage unionized
1.	Age and Schooling	0.6
2.	Occupation	-2.4
3.	SIC	1.2
4.	Census division and SMSA residence	0.6
5.	Race, sex, marital status	-0.8
6.	Mix of construction activity within state	3.4
	Predicted change in unionization	2.6
	Actual change in unionization	-6.6

Source: Appendix Table A

Table 5. Union-nonunion wage gap estimates, 1967-1981

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	CPS, All occupations	Ashenfelter, construction workers	CPS, construction workers	(4), without personal characteristics	(4), simple regression	(4), adjusted for collective bargaining coverage	(4), adjusted for union members in nonunion sector
1967		37.7					
1973	52.8	53.7	60.0	76.1	87.0		68.0
1974	51.4		55.0	67.7	82.2		64.0
1975	54.8	53.7	57.4	70.4	83.7		70.1
1976	54.8		61.1	76.8	89.1		76.1
1977	55.3		60.3	75.9	86.4		77.0
1978	55.0		59.5	74.2	87.2	57.6	70.4
1979	41.5		43.2	58.9	71.6	41.3	64.7
1980	47.2		50.4	63.1	73.0	50.7	68.0
1981	38.8		38.5	51.7	61.6	41.3	57.8
1983	44.3		45.8	59.7	64.0	44.8	

Table 6. Union-nonunion wage gap estimates for construction workers, by region, 1973-1981

Year	U.S.	Northeast	Midwest	South	West
1973	60.0	67.5	61.0	56.0	56.4
1974	55.0	57.1	52.8	59.8	42.6
1975	57.4	59.8	54.5	57.4	50.4
1976	61.1	46.1	72.3	57.1	57.4
1977	60.3	58.6	62.2	61.6	53.6
1978	59.5	53.7	58.4	57.9	62.9
1979	43.2	42.6	39.4	53.6	46.1
1980	50.4	53.9	45.6	54.3	47.2
1981	38.5	26.6	59.7	40.8	30.7
1983	45.6	44.5	45.8	40.1	50.6
Mean, 1973-75	57.5	61.5	56.1	57.7	49.8
Mean, 1980-83	44.8	41.7	50.4	45.1	42.8

Table 7. Coefficients and standard errors of construction industry production functions

Independent variables:	1972 means	1977 means	1982 means	Dependent variable:				
				1972 value added per employee	1977 value added per employee	1982 value added per employee	1972 value added per employee Dodge Cost Index	1977 value added per employee Dodge Cost Index
log (K/L)	-.195 (.696)	.261 (.627)	.739 (.520)	.253 (.046)	.427 (.054)	.307 (.047)	.186 (.039)	.319 (.045)
log (employees per establishment)	2.472 (.636)	2.387 (.669)	2.429 (.685)	.014 (.040)	.168 (.035)	.102 (.039)	.030 (.033)	.104 (.029)
Percent union	.374 (.179)	.319 (.208)	.300 (.163)	.327 (.070)	.191 (.058)	.217 (.095)	.160 (.059)	.078 (.049)
Labor quality factor	1.366 (.090)	1.599 (.093)	1.936 (.095)	.435 (.201)	-.154 (.174)	.064 (.263)	.386 (.170)	-.187 (.145)
R^2				.915	.814	.726	.895	.794
N				81	153	153	81	153

Note: Each equation also contains an intercept and two industry and eight region dummies. The 1972 equations the ratio of net to gross capital.

Appendix Table A. Union membership equation coefficients and decomposition of sources of unionization, 1973-1981.

Variable	Coefficient	Standard error	Mean 1973	Mean 1981	Change 1973-81	Effect on fraction unionized
1. Labor quality						.006
Age	.034	.002	35.7	35.1	-0.6	-.020
Age squared	-.00035	.00002	1454	1396	-58	.020
Schooling	.0063	.0014	11.6	12.6	1.0	.006
2. Occupation						-.024
Professional	-.410	.025	.021	.034	.013	-.005
Managerial	-.300	.016	.084	.108	.024	-.007
Sales	-.460	.051	.002	.008	.006	-.003
Clerical	-.302	.022	.067	.089	.022	-.007
Craftsmen	.022	.010	.555	.519	-.036	-.001
Operatives	.085	.018	.050	.043	-.007	-.001
Transport	-.005	.021	.031	.026	-.005	*
Service	-.162	.052	.004	.005	.001	*
3. Industry						.012
SIC 15	-.112	.017	.350	.262	-.088	.010
SIC 16	-.073	.018	.170	.134	-.036	.003
SIC 17	-.088	.016	.477	.483	.006	-.001
4. Location						.006
New England	-.329	.028	.060	.060	0	0
Middle Atlantic	-.199	.025	.156	.115	-.041	.008
E.N. Central	-.092	.021	.176	.164	-.012	.001
W.N. Central	-.141	.020	.060	.077	.017	-.002
S. Atlantic	-.300	.016	.213	.179	-.034	.010
E.S. Central	-.224	.023	.072	.061	-.011	.002
W.S. Central	-.287	.018	.102	.150	.048	-.014
Mountain	-.065	.021	.060	.065	.005	*
SMSA	.082	.008	.674	.686	.012	.001
SMSA missing	.020	.017				
5. Demographics						-.008
Black	-.020	.014	.086	.068	-.018	*
Other nonwhite	.009	.032	.011	.010	-.001	*
Male	.133	.021	.943	.914	-.029	-.004
Married, spouse present	.069	.009	.741	.681	-.060	-.004

Table A (continued)

Variable	Coefficient	Standard error	Mean 1973	Mean 1981	Change 1973-81	Effect on fraction unionized
6. Construction mix						.034
Government	.032	.139	.282	.198	-.084	-.003
Maint., repair	1.566	.232	.110	.179	.069	.108
Homes	-.020	.298	.217	.170	-.047	.001
Apartments	1.775	.386	.094	.045	-.049	-.087
Heavy	.656	.276	.168	.198	.030	.020
Retail	2.347	.698	.047	.054	.007	.016
Education	.807	.414	.063	.030	-.033	-.027
Hospital, inst.	-.222	.463	.045	.045	0	0
Industrial	.251	.337	.124	.135	.011	.003
Office	.078	.329	.076	.142	.066	.005
Highway	.198	.358	.076	.066	-.010	-.002
7. Year						
Intercept	-.957	.279				
1974	-.017	.012				
1975	-.034	.023				
1976	-.046	.023				
1977	-.037	.023				
1978	-.067	.023				
Predicted change in fraction unionized						.026
Actual change in fraction unionized						-.066

Note: The regression equation was estimated over a sample of 15450 persons in the May 1973-1978 Current Population Survey. The mean (S.D.) of the dependent variable is .359 (.480). The summary statistics are standard error, .423; F-ratio, 101.58; and R^2, .225.