

NBER WORKING PAPER SERIES

HUMAN RESOURCE POLICIES AND
UNION-NONUNION PRODUCTIVITY DIFFERENCES

Steven G. Allen

Working Paper No. 2744

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 1988

This paper was presented at the Academy of Management meetings in Anaheim, August 9, 1988. I have received helpful comments from Barry Gerhart, John Fossum, Dan Hamermesh, Barry Hirsch, and Brian Bemmels. This paper is part of NBER's research program in Labor Studies. Any opinions expressed are those of the author not those of the National Bureau of Economic Research.

NBER Working Paper #2744
October 1988

HUMAN RESOURCE POLICIES AND
UNION-NONUNION PRODUCTIVITY DIFFERENCES

ABSTRACT

Many researchers in both economics departments and business schools recently have become interested in examining how much of an effect human resource decisions and policies have on firm performance. This paper surveys the literature on unionism and productivity and discusses its implications for future research on more general issues. The main focus is on (1) conclusions as to whether unions raise or lower productivity and (2) procedures used to identify the channels through which unions affect productivity.

The studies of unions and productivity have documented large productivity differences between seemingly comparable union and nonunion establishments. In many cases unionism is associated with higher productivity, especially when unionized firms are in a competitive environment. However, the mechanisms responsible for union-nonunion productivity differences in each study remain poorly understood, either because detailed information on how unions affected company decisions was not available or because the available information produced inconclusive results. These conclusions suggest that human resource policies can have a very large effect on financial outcomes, but our ability to estimate the magnitude of that effect for a particular policy is currently very limited.

Steven G. Allen
Department of Economics and Business
North Carolina State University
Box 8110
Raleigh, NC 27695-8110

In mainstream economic theory, unions are viewed mainly as wage-raising institutions. Managers respond to higher wages by cutting back or shutting down operations that are no longer profitable. Beyond this, they take steps to offset the cost of higher wages by substituting capital for labor and increasing the skill level of the work force through adjustments in training and hiring procedures. The result is greater observed productivity in union than nonunion establishments. Despite the productivity gains, economists view union-generated wage increases as socially undesirable because in theory the cost of higher wages is never completely offset by additional productivity, resulting in greater unit costs and reduced output. Unions further reduce output and productivity through strikes and restrictive work practices.

This standard view has been challenged over the last dozen years by work initiated by Professors Richard Freeman and James Medoff of Harvard University. Drawing from Hirschman's (1970) "exit-voice" model, Freeman and Medoff (1984) argued that unions should be viewed as institutions that give workers voice at the workplace. Union voice can result in increased productivity through a variety of mechanisms -- reduced turnover, more informal training and information sharing among workers, better communication between workers and management, and improved morale. It can also have a "shock effect" on management, the result of which is that decision making becomes more sensitive to worker reactions (Slichter, Healy and Livernash, 1960).

There is now a sizable empirical literature examining the effect of unions on productivity. This literature is highly relevant for understanding the impact of human resource policies on firm performance for two reasons. First, despite the sharp drop in union organizing success, the question of what is likely to happen to a firm if it becomes unionized remains a very important issue. Faced with the threat of unionization, managers must judge whether the

costs of becoming organized are greater than the costs of attempting to remain nonunion. Today in the private sector it is quite clear that almost all managers believe the costs of becoming organized are greater. However, there is evidence that managerial views on this question were quite different in the 1940s (Kochan, Katz, and McKersie (1986)) and one should not totally discount the possibility that these views may change again in the future.

Second, many of the studies in the literature on unions and productivity (UP) attempt to identify the key mechanisms causing any observed productivity differences, a central issue in the new literature on human resources and firm performance (HRFP). Because the focus is almost always on human resource practices, the UP studies end up asking exactly the same types of questions as the HRFP studies, as one can see from the surveys of the HRFP literature in Kleiner *et al.* (1987). Not only does the UP literature provide a set of "preliminary results," but also it points out the difficulties in obtaining useful conclusions about the impact of human resource practices.

After a summary of the key mechanisms through which unions affect productivity, this paper surveys the UP literature. The survey focuses on (1) conclusions as to whether unions raise or lower productivity and (2) studies that attempt to identify channels through which unions affect productivity. The last section of the paper assesses what is currently known about unions and productivity and discusses useful future research directions for both the UP and HRFP literatures.

I. HOW UNIONS INFLUENCE PRODUCTIVITY

One important route through which unions influence productivity has already been noted in the introduction: higher union wages create an incentive to find substitutes for labor. This is but one of many channels through which a union can influence the productivity of an establishment. A newly unionized establishment is likely to witness across-the-board changes in its human resource policies, especially those dealing with hiring, promotion, layoffs, training, and planning. The adjustments in compensation practices will be much more complex than a simple change in the overall wage level. Unionized firms tend to have relatively small occupational and geographical wage differentials. They also tend to spend a larger share of their compensation package on employee benefits and a smaller share on pay linked to individual or group performance. Management behavior also changes under unionism. In the short run, one must consider the initial shock effect of union organization, the constraints spelled out by the current contract, union recourse under grievance procedures, and the desire for peaceful settlement of future contracts. Over a longer time horizon, policies toward union cooperation or union avoidance often turn out to be a key element in corporate strategy.

Some of the most salient features of unionism that are believed to influence productivity are summarized in Table 1. This table is not intended to be all inclusive, nor does each factor listed in the table apply to every organization. The table should be viewed as merely a reflection of how today's economists think unions affect productivity. Although there is much more to this thinking than the simple textbook tale about factor substitution, it is useful to emphasize the distinction between productivity changes arising from higher wage levels and productivity changes arising from sources other than

wage levels. This is done in the table by indicating whether the main source of a particular channel of union influence is wage (W) or nonwage (N). Because one would naturally expect unions to raise productivity through higher wage levels, every UP study attempts to control for wage-induced changes in capital intensity and skill levels. HRFP studies will also have to make this distinction whenever the HR practice under examination is correlated with the wage level.

Both the wage and nonwage channels of union influence should result in a workforce with an upgraded skill level. Higher union wage levels give managers the incentive to raise hiring standards and cut back on unskilled labor. With the higher wage there is also generally a queue of workers wanting jobs, enabling firms to make these adjustments without extra recruiting expenditures. Higher union wages reduce turnover, thereby increasing the incentive to spend more on training. Freeman (1980a) has shown that the overall reduction in turnover under unionism is much larger than one would expect from higher union wages. He attributes this turnover reduction to the greater voice unions give employees in workplace decision making. With voice at the workplace, union members are less likely to quit their jobs when they are unhappy with working conditions or human resource policies, leading to even more training under unionism. Another factor leading to more investments in training under unionism is the continued reliance in sectors such as construction on an occupational mix molded by craft traditions, with apprenticeship remaining the key route of entry into the craft. A final reason to expect workers in unionized establishments to be more highly skilled than their nonunion equivalents is the greater cost of false positive errors in hiring decisions.

Managers are likely to raise their hiring standards in order to offset union-imposed restrictions on job assignments, layoffs and dismissals.

If work effort is a simple matter of carrots and sticks, then one would naturally expect unions to be a negative factor. The use of seniority in making promotion decisions in unionized establishments is well known. Many nonunion establishments base their promotions on seniority as well (Abraham and Medoff, 1985). This does not mean that union and nonunion carrots for promotion are identical. Compensation packages under unionism tend to have highly compressed occupational wage differentials (Freeman, 1980b, 1982). The spread in compensation among different jobs is further compressed by the large share of the package which goes to health insurance, retirement plans, and paid time off (Freeman, 1981). Another factor that may diminish the size of the union carrot is the less frequent use of merit pay and other incentive pay mechanisms, although this requires the controversial and empirically questionable (Ehrenberg and Milkovich (1987)) assumption that such pay systems actually influence employee behavior in the desired fashion.

Two other key mechanisms through which unions are believed to reduce work effort are work rules and grievance procedures. Work rules, both written and unwritten, result in too many jobs and too much break time, accompanied by restrictions on output levels and management's ability to get the job done in the most efficient manner. Grievances undermine productivity by reducing the penalty for shirking and by protecting incompetent and dishonest workers.

Once one goes beyond this no-carrots/no-sticks scenario to examine other factors believed to influence work effort, a different picture emerges. Some of the very factors listed above as decreasing productivity under unionism from a carrots/sticks framework turn out, when viewed from a different perspective,

also to be factors leading to increased productivity. For instance, compressed pay structures and promotion and layoff by seniority reduce the incentives for rivalry in the workplace and make it easier to promote cooperation among workers. Limitations on the ability of supervisors to discharge make employees feel more like long-term stakeholders, thereby encouraging them to be more committed to their employer.

The "exit-voice" model is also relevant for work effort. Freeman and Medoff (1984) argue that unions are essential if employees are to have a true voice in the work place. One obvious reason that unions are viewed as essential for voicing worker concerns is fear. In a nonunion setting, a worker who speaks out about workplace issues at a minimum risks being labelled as noncooperative and at a maximum risks losing his job. Another reason is that working conditions, human resource policies and the behavior of managers are what economists call "public goods," conditions that everyone in the workplace "consumes." No public good, whether it be national defense or occupational safety, will be provided in adequate amounts by voluntary, individual behavior because the individual bears all the costs and must share the benefits with everyone else. The economically rational individual will instead wait for someone else to speak out about public goods at the workplace, the result being an inadequate flow of information to management about worker concerns. Workers will speak out only when the costs of doing so are offset by the expected benefits to them as individuals. The collective institution of unionism can get around this problem in theory by sharing the costs of voice behavior equally across all workers, changing the decision rule to a tradeoff between group benefits and group costs.

Unions send messages to managers through informal day-to-day interaction as well as through formal grievance procedures and contract negotiations. Many nonunion firms have attempted to put their own grievance systems into place, but unless such systems are subject to outside arbitration or a balanced review panel containing both workers and managers, workers still may view such systems as an extension of management and use them infrequently. As a result, managers in unionized workplaces are likely to be better informed, which should increase productivity. Workers are also more likely to make suggestions for productivity improvements when bargaining allows the gains to be shared between the firm and the workforce. Grievances and contract negotiations also give workers a voice in how the workplace is run. If more voice at the workplace raises morale, productivity is even further enhanced. Needless to say, many managers dispute this theory, pointing out cases where unions have created conflict where none previously existed and other cases where dissatisfaction with the union resulted in reduced efficiency.

The response of management to unionization is a critical factor in determining the influence of unions on productivity. Slichter, Healy, and Livernash and Clark (1980b) note that in many cases there are often dramatic changes in managerial practices when a plant becomes covered by a collective bargaining agreement. There is a greater reliance on company or plant policy in making decisions and less reliance on the judgment of any individual manager. When policies are not applicable or when developing policies, management becomes more likely to think through the consequences of any decisions and make appropriate adjustments. The emphasis on policy and accountability often spreads to other areas of decision making, such as production scheduling and quality control. There are also usually some

personnel changes; frequently the plant manager is replaced and supervisors are either replaced or retrained.

Any productivity gains obtained from more professional managerial techniques can be offset by the reduction in flexibility which inevitably takes place under unionism. Union and nonunion managers alike almost always claim that the biggest advantage to remaining nonunion is flexibility. Occupational jurisdictions and contract provisions limit the ability of managers to optimally assign workers to jobs. Fluctuations in the demand for labor result in further inefficiencies as unions limit managerial discretion in layoffs, overtime, and subcontracting. However, many nonunion firms voluntarily follow policies that are just as "inflexible" as those followed in their unionized counterparts. These include promises to workers that they will not be laid off and de facto seniority rules for promotions.

Unions can also influence the amount of resources the firm allocates to managerial tasks. For instance, lower turnover under unionism reduces recruiting, hiring, and training costs; the union even performs a number of personnel functions in industries such as shipping and construction. However, higher union wages also imply a queue of applicants that must be screened more carefully because of union-imposed restrictions on the right to dismiss or reassign.

A final factor behind any observed union-nonunion productivity differences is technology. In a static context, the direction of union impact is unclear. Managers have an incentive to use a less labor-intensive technology to offset the higher wages, but union work rules may limit this type of adjustment. Over a longer time horizon, managers must trade off the gains from R&D oriented

toward further reductions in labor intensity against the risk that the union will be able to expropriate such gains at the bargaining table.

As the above discussion and the accompanying table indicate, it is hard to draw any general conclusions about the overall impact of unions on productivity from a purely theoretical discussion. The research question that various studies have tried to address is to determine the net effect of the nonwage channels of union influence discussed above. If they show no change or a reduction in productivity, then the institution of unionism is clearly undesirable on economic grounds (although not necessarily on the grounds of equality and social cohesion). If the influence is positive, it is important to learn whether the productivity gains are large enough to offset the output losses associated with higher wages. Regardless of whether the effect is positive or negative, it is also important to determine whether the sources of the productivity gains can be isolated so the forces that determine productivity at the workplace can be better understood.

II. EVIDENCE ON OVERALL UNION IMPACT

To estimate the impact of unions on productivity through channels other than increased wages, the procedure most commonly used in the UP literature is to estimate a Cobb-Douglas production function where the intercept is allowed to vary with unionization. The usual specification is an OLS regression of the log of output per hour or employee on the log of the capital-labor ratio, some control variables for labor quality, and a unionization variable. Two types of data have been used in these studies. Brown and Medoff (1978) and Allen (1984)

use Census data broken down by two-digit industry and state or region, supplemented by data on percentage union members and labor quality from the public use tapes for the Current Population Survey. This type of data set has been widely used by economists to study such issues as the effect of education on productivity and the substitutability of labor for capital. The advantage of using such data is that they are comprehensive, reasonably accurate, and readily available in the government documents section of the campus library. All other studies use some type of micro data, usually collected from establishments. These data sets generally contain information on more variables than the Census reports and the results are free of any possible aggregation bias created by arbitrary state by industry classifications of heterogeneous establishments.

The productivity measure used in the earliest studies is value added (dollar value of output minus expenditures for materials) per hour or employee. Most studies done in the 1980s have used some physical measure of output. In theory the value added concept allows the researcher to compare output and productivity levels across different industries or within an industry where there is considerable product differentiation.

In practice there are two difficulties with using value added as an output measure in a UP study. The main difficulty is that prices of homogeneous goods and hedonic price functions of heterogeneous goods vary over establishments, geographic location, and time. This requires some type of price deflation to make sure that the variation in value added reflects output variation rather than price variation. A related concern is that value added not only equals the value of output to buyers, but also equals the cost of labor and capital to producers. Higher union wages translate into higher labor costs as long as

labor demand is sufficiently insensitive. Critics of the UP studies often claim that the studies are actually reporting wage equations, not productivity equations.

In practice this claim seems to be totally unsubstantiated. The union-nonunion wage difference, generally believed to be in the neighborhood of 15 percent, is much smaller than the productivity difference reported in many of the studies. Also, some studies report results for both value added and some physical measure of output. The results show no tendency to obtain systematically larger estimates of productivity gains under unionism when output is measured in terms of value added. This concern about possible systematic upward bias seems to have unnecessarily limited the scope of recent UP studies to markets where output can be measured in physical terms.

Turning from methodology to results, there seem to be three main conclusions from the private sector UP studies summarized in Table 2. The most striking conclusion is that many studies tend to find productivity to be higher under unionism, even after one controls for the greater capital and skill intensity of unionized workplaces. This implies that there are sizable productivity gains associated with the voice and shock effects discussed above and that the productivity losses associated with union work rules, reduced management flexibility, and no-carrots/no-sticks are relatively small.

Brown and Medoff (1978) was the first published study to show productivity to be higher under unionism. They found that in 1972, productivity in unionized manufacturing establishments was as much as 25 percent higher than in nonunion settings. Work done by Jonathan Leonard reported in Freeman and Medoff (1984) replicated this finding for 1977. Further substantiating evidence was provided in Frantz's (1976) study of the furniture industry. All

of these studies used value added as their output measure. Clark (1980a,b) found similar conclusions in the cement industry in both a cross section study based on 1973-1976 data and a before-after comparison of productivity in six plants unionized between 1953 and 1976. Clark was the first to report results where output was measured in physical units (tons of Portland cement).

Two manufacturing studies found no union-nonunion productivity difference: Clark's (1984) study of lines of business in 902 large corporations and Kaufman and Kaufman's (1987) study of 37 auto parts manufacturing plants. Almost all of Clark's sample consists of Fortune 1000 companies, whereas other studies examine firms of all sizes. If the union productivity advantage found in other studies is limited to smaller organizations, then his results could still be consistent with studies finding a positive overall union productivity effect. Another possible explanation for the difference between Clark's results and those of Brown and Medoff is that UP studies are very sensitive to different aggregation techniques. It is instructive to note that Clark's study also finds that unions reduce profit rates in unconcentrated industries but not in concentrated industries, exactly opposite to the pattern found in other studies of unionization and profitability using Census and stock market data. Further work is needed to determine the role played by aggregation and sample restrictions based on firm size in generating these two very different sets of results for manufacturing. It is more difficult to pinpoint possible explanations for the findings of Kaufman and Kaufman, except to note that there is no reason to expect unions to be associated with higher productivity in every setting.

Finally, Bemmels (1988) finds productivity to be 32 percent lower in unionized plants in manufacturing. This finding is based on 46 responses

generated from a survey of 1,000 firms, raising questions about the representativeness of the sample. The results also imply an implausibly low estimate of capital's share of output. Despite these limitations, this is the only UP study based on recent data.

The second main conclusion is that the impact of unionism on productivity varies with product market structure. This is shown very strikingly in my studies (1986a, 1986b, 1988b) of various types of construction projects. In private sector work, the productivity of union contractors is much greater than that of nonunion contractors, whereas there is no significant union-nonunion productivity difference in projects completed for the public sector. These are the same unions and the same contractors. In the hospital and nursing home sample, they are the same types of structures. Two key reasons for the difference in the results seem to be inadequate pressures for cost minimization in the public sector and prevailing wage laws that effectively prevent competition from nonunion contractors in many markets.

The third main conclusion is that the impact of unionism on productivity can change dramatically over time. Connerton, Freeman, and Medoff (1983) found that in 1965 productivity of union mines in the bituminous coal industry was 25 to 30 percent greater than that of nonunion mines. A mere ten years later, productivity in union mines was 20 to 25 percent lower. They attribute this largely to changes in the leadership of the United Mine Workers (UMW) union. Until 1960 the union was run by John L. Lewis. Operations were centralized and internal dissent was not tolerated. After Lewis' retirement there was frequent turnover in union leadership (including the conviction of union president Tony Boyle for ordering the murder of his opponent Joseph Yablonski) and a breakdown in discipline, reflected in a rapid increase in the number of wildcat strikes.

The union productivity advantage has also declined substantially in the construction industry. My 1988a study shows that for the entire industry union productivity was about 20 percent higher than nonunion productivity in 1972, but a statistically insignificant 6 and 8 percent higher in 1977 and 1982. A key factor behind this change seems to be the rising share of union members working for nonunion contractors, which has offset the lack of training possessed by most nonunion workers. In both bituminous coal and construction, the market share of unionized establishments has declined substantially as one would expect when higher wages are no longer offset by higher productivity.

Only one study has been done of the impact of unions in the service sector. Graddy and Hall (1985) compared productivity of the 30 banking establishments unionized in 1982 with a matched sample of 30 nonunion banks. They found productivity to be 11 percent lower in the unionized banks.

Even in cases where unionism is associated with higher productivity, the "bottom line" question is whether this efficiency gain is offset by higher union wages. The most direct way of examining this question is to estimate a cost function, a relationship linking total costs to input prices and output. The cost function evidence is mixed. My 1987 study finds that average cost per square foot is about the same for office buildings constructed by union and nonunion contractors, with union contractors having a cost advantage on large office buildings and nonunion contractors having an advantage on smaller projects. The same study found nonunion contractors had a cost advantage in school and hospital construction. In retail construction, my 1988b study found roughly equal costs for union and nonunion contractors. Cost studies have also been done for hospitals. Salkever (1982) and Sloan and Adamache (1984) both find unionism associated with higher costs.

Indirect cost estimates can be obtained by comparing the union effects on productivity and wages as long as information is available on labor's share of total costs. Estimates of the impact of unions on wages almost always come from data on individual workers, whereas the productivity results are based on establishments or Census aggregates of establishments. Lewis concludes that estimates of union-nonunion wage gaps based on aggregated data "substantially overestimate" (1986, p. 45) the true union impact. Without knowing the impact of aggregation on the productivity gap estimates, comparisons of wage and production equation results must be interpreted with some care. These comparisons generally find that when unions are associated with higher productivity, the union-nonunion wage gap is slightly larger than the productivity gap, implying that union and nonunion costs are comparable. Of course, in studies finding zero or negative union productivity effects, higher union wages necessarily imply higher costs.

The most relevant "bottom line" measure from the firm's point of view is profits. Studies of the effect of unions on profitability are surveyed in Freeman and Medoff (1984, ch. 12) and Addison and Hirsch (1989). The profit studies all reach the same conclusion: unions reduce profits. Whether this reflects a transfer from owners to union members or a loss in efficiency remains a subject of ongoing research, which is discussed very well by Addison and Hirsch.

III. EVIDENCE ON SOURCES OF UNION IMPACT

The evidence summarized above shows that unionization is often correlated with higher productivity and that the impact of unionization on productivity varies across different sectors of the economy and over time within each sector. Yet it does not reveal any information about the mechanisms through which these productivity adjustments take place. In fact, many of the studies summarized above make no effort to account for the sources of the reported union-nonunion productivity difference. In these studies unionism is nothing more than a label on a black box, inside of which are hidden the true mechanisms of adjustments at the workplace (Lewin and Feuille, 1983).

In defense of the "black box" studies, including Allen (1986b, 1988b), three points should be noted. First, the reaction of most academic economists to studies that claimed to find higher productivity under unionism (holding skills and capital-labor ratios constant) can be best characterized as incredulous. This meant that the authors of the earliest studies had to devote a considerable amount of research effort to establishing the robustness of their results to all conceivable theoretical and econometric objections. These efforts seem to be much more appreciated within the economics profession than in other academic circles. Second, many of the studies have relied on secondary data sources and in many cases the party collecting the data was not at all concerned with UP issues. In such situations it is extremely difficult for the researcher to derive any statistical conclusions about what is going on inside the black box. Third, it can be argued that the black box criticism applies across all research areas in labor economics, not just the UP literature. Why are education and experience correlated with earnings? Why are real wages procyclical? What determines when a person will retire? Many

other fields of research in labor economics have not advanced very far beyond the black box stage.

One simple approach used in many UP studies to establish the mechanisms through which unions influence productivity is to add interaction terms between unionization and other variables or, equivalently, to split the sample into smaller groups and compare the union coefficients of each group. For instance, Clark (1980a) finds that the union coefficient in cement manufacturing is greater in the Southwest than in the South or North Central regions and is positive for new plants but near zero for old plants. Noting the prevalence of nonunion plants in the Southwest, Clark points out that union plants in that region may be responding to greater competitive pressure. Another example of this approach is my 1988a study, in which the union coefficient varies with the percentage of union construction workers employed by nonunion contractors. The results showed that the union productivity advantage is much smaller in areas where a large share of union workers are employed in the open shop. This suggests that worker characteristics such as training and experience are key sources of the union productivity advantage in that sector. Clark (1984) tested whether the union coefficient varied with the market share of the firm or with percentage of the firm unionized but found that neither factor had any impact on the size of the union coefficient. Graddy and Hall tested the impact of the size of the bargaining unit and the maturity of the labor-management relationship on productivity in their union sample, but once again neither variable had any explanatory power. Other researchers have no doubt tried this approach as well and come up emptyhanded. Estimating interaction terms thus far has yielded a couple of useful clues about possible sources of union-nonunion productivity differences but no hard evidence.

An approach that would seem to be much more promising is to collect data on the mechanisms believed to cause union-nonunion productivity differences and add these variables to the model. This is based on the premise that the union productivity effect varies within the sample and that some of this variation reflects differences across both union and nonunion firms in such causal variables as turnover, job satisfaction, communication, and management. In theory one could account for how much of the union productivity advantage results from a particular variable by observing the change in the union coefficient when that variable is added to the model. For instance, suppose that differences in job satisfaction fully account for the union-nonunion productivity difference in a particular sample. Then when this variable is added to the model, the union coefficient should become zero.

This approach was first used by Brown and Medoff to determine how much of their estimated union productivity advantage could be explained in terms of reduced turnover. When they added the quit rate to their model, the union coefficient dropped from .205 to .160, indicating that lower turnover accounts for 22 percent of the overall effect and that other factors (communication, morale, management, etc.) account for the remainder.

In their study of the coal industry, Connerton, Freeman, and Medoff compared the growth in strikes across different states to productivity growth, finding that productivity declined the most in states where strikes increased most rapidly.

I have also used this approach in two of my studies of the construction industry. In my 1984 study using Census data, I added the ratio of production workers to total employment and the fraction of workers who have completed apprenticeships to the model. The first variable was meant crudely to adjust

for changes in the occupational structure (a control for observable labor quality associated with experience and education was already in the model), whereas the second reflected training practices. These two variables accounted for 15 to 27 percent of the union effect on productivity.

The data set analyzed in Allen (1986a) was collected by the Bureau of Labor Statistics to measure and analyze productivity in the construction industry. A likely source of some of the union productivity advantage in office building construction was lower supervisory requirements. To test this, I added the ratio of supervisor to total hours and found this accounted for 10 percent of the union effect.

A unique aspect of this data set was that the interviewers asked the general contractors questions about the impact of seven different factors on productivity in their project: weather, strikes, building codes, apprenticeship programs, prefabricated components, standardized components, and supply of skilled workers. Although this battery of questions ignores some obviously important factors, one would think ex ante that some of this information would help identify the underlying sources of higher union productivity.

Ex post this information turned out to be nearly useless. There turned out to be very little difference between the responses of union and nonunion contractors. "No effect" was by far the most common response for every factor on the survey. The factor that seemed to have the biggest impact on productivity in the contractors' minds was the weather, especially among union contractors (for reasons unknown). Complicating matters further was the finding that when each factor was added to the model, its coefficient almost always turned out to be zero. The only reportable result I obtained from this analysis was a finding that the greater tendency among union contractors to

report that standardized components raised productivity accounted for as much as 8 percent of the overall effect. Combining this with the supervisor ratio and two other variables (ratio of unskilled and semiskilled hours to total hours and dollar volume of office building construction), I was able to "explain" 26 percent of the overall union effect.

Kaufman and Kaufman also tried this approach and came up emptyhanded. Their study probed into eight different personnel policies: grievances, promotions, layoffs, restrictive work rules, job reassignment during slack periods, work by supervisors, job posting systems, and profit-sharing. They found union plants made greater use of seniority in promotions and layoffs and were more likely to have restrictive work rules, grievance systems, and job posting systems. Union plants were less likely to have profit sharing plans and managers in those plants had less ability to reassign workers or use supervisors. No one should find any of these conclusions especially surprising. What is a bit shocking, however, is that none of these policy variables were at all related to productivity. Granted the sample size was small (30 plants for this part of the analysis), but it is naive to think that anyone looking into these issues is going to have the CPS-esque luxury of thousands of observations.

The only other way to determine the sources of union productivity effects besides statistical probing is that old, familiar business school standby -- the case study. The case study will rarely produce quantitative evidence, but it holds some promise in regard to its ability to determine whether a particular channel of union effect has played an important role in a particular situation. To explain his before-after finding that unionization raises productivity by 6 to 8 percent, Clark (1980b) interviewed union officials and

management. His interviews successfully isolated changes in personnel practices. When they were nonunion, plants tended to have no formal grievance procedures (and thus very few grievances); promotions, layoffs, and recalls were made by foremen using unspecified criteria. This all changed in a predictable fashion after unionization.

Clark found substantial changes in management. In each case a new plant manager was brought in and foremen were either replaced or retrained. In most plants, formal methods of organizational control were introduced. This usually involved setting production targets, followed by reviewing and assessing actual performance. One plant manager noted that "...before the union this place was run like a family; now we run it like a business." Clark concludes that these changes were one of the "key adjustments to unionization."

Clark's findings about changes in workers' behavior point out another potential limitation of the case study approach. Unable to collect before-after data on turnover, absenteeism, worker attitudes, or discipline problems, Clark had nothing to draw on except interviews with union and management representatives. He found no solid evidence of any change in turnover or absenteeism, whereas union and management views concerning changes in morale often differed.

IV. ASSESSMENT AND FUTURE DIRECTIONS

The UP literature has documented large productivity differences between seemingly comparable union and nonunion establishments. The sign and the

magnitude of the estimated differences vary considerably across different studies. Evidence indicates that unionized establishments are most likely to have a productivity advantage when they must compete on equal terms with the nonunion sector. The two studies that have examined unionism and productivity from a dynamic standpoint have both found the estimated union-nonunion difference to have changed dramatically over time in a direction unfavorable to the competitive position of unionized establishments.

Faced with this evidence, it would seem very difficult to deny that differences in the human resource practices and policies must be at least partly responsible for these productivity differences. This is a very encouraging signal for the HRFP literature. The prospect that human resource management can generate productivity changes of as much as 25 percent should be sufficient to motivate and support HRFP research.

Nonetheless, I think it would be fair to say that most academic labor economists today remain far from convinced that such a conclusion can be drawn from the UP literature. A detailed critique is provided by Addison and Hirsch. Here I will focus on what I believe to be the two most serious contentions. One reason behind this skepticism is that information about labor quality in the UP literature is usually limited to occupational mix, schooling, and experience. If this were all employers really needed to know about the potential contribution of a job applicant, they would not have to spend any resources on screening. Of course, we all know that employers learn much more than this about all applicants and employees. This information, known to the employer but not to the person analyzing the data, is usually referred to as unobservable labor quality. The problem this poses for the UP literature is that under the greater competitive restraint imposed by higher wages, managers

in the union sector should tend to hire more productive individuals than those in the nonunion sector. Thus, some of any estimated union productivity advantage is likely to be attributable to unobservable labor quality.

The issue is "how much?" The estimated union-nonunion productivity difference has not been at all sensitive to the inclusion of observable labor quality control variables in any UP study. If the estimates are not sensitive to factors such as schooling, experience, and occupation, it is very hard to believe they will be more sensitive to some missing variable. Observable human capital variables generally explain as much as half the interpersonal variation in wages. Are we to believe that unobservables explain a much larger fraction of interestablishment differences in productivity?

Selectivity bias is another rationale given by those who discount the UP literature. Unions presumably are successful in raising wages whenever they organize an establishment. Some organizations adapt successfully. The data sets used in the UP studies generally do not contain information on those that do not. As a result, the estimated productivity level of unionized establishments is biased upward.

This criticism can be questioned on both theoretical and empirical grounds. Theoretically, selection bias can operate in either direction. The case outlined above is one of positive selection bias where the "best plants" are the ones that get organized. Yet from a logical standpoint, one must also admit the possibility of negative selection bias where the "worst plants" get organized, in which case the union-nonunion productivity difference is underestimated by OLS regressions. Most experts on union organizing campaigns will tell you that today it is the "worst plants" that stand the best chance of getting organized. Whether this was true fifty years ago when CIO-affiliated

unions were organizing the likes of U.S. Steel and Ford is more questionable. The observed distribution of union and nonunion establishments in any data set is a byproduct of selection processes from different historical periods. Their overall direction is uncertain.

Empirically, note that Clark obtained exactly the same results in simple cross section and longitudinal analysis in his studies of cement industry productivity. This is difficult to reconcile with pronounced selectivity bias. More fundamentally, many studies of the union wage effect have attempted to isolate a positive selectivity bias in OLS wage equations generated by the same process that supposedly has biased the UP literature. These studies, summarized in Lewis (1986), have failed to produce any agreement about not only whether the bias is small or large but also whether it is positive or negative.

Even if one accepts the conclusion that the UP literature has firmly established that human resource management practices can generate large productivity differences, the one discouraging signal for the HRFP literature is the extremely limited knowledge that has been obtained about the mechanisms through which human resource policies and outcomes affect productivity. The UP literature has produced quantitative evidence that productivity is related to supervision and training in construction and turnover in manufacturing. In each case, however, most of the union-nonunion productivity difference remains unexplained. All other studies that have attempted to obtain quantitative evidence about sources of union-nonunion productivity differences have been unsuccessful. Clark (1980b) obtained some useful conclusions about the impact of unionization on management from interviews, but even here one is left with the question of which was more important -- changes in managerial techniques or

changes in managerial personnel? Recall also that the interview approach was poorly suited for learning about changes in worker behavior.

To some extent this dearth of conclusions can be attributed to faulty experimental design. One can point in some cases to the use of secondary data sources; in others, to inadequate resources for primary data collection or the inherent limitations of interviews. If one accepts this line of argument, it would then be sensible to conclude that one way to increase the odds that future studies will be more successful is to provide those doing such studies with more resources and to direct those resources toward collecting more quantitative data on a wider array of variables from more establishments.

This very well may be the ticket, but after reading Katz, Kochan, and Keefe (1987), I have reservations. Katz, Kochan, and Keefe analyzed productivity differences across 53 plants of a major automobile manufacturer in the United States and Canada. They were able to examine how four productivity measures (supervisors per 100 production workers, labor hours per vehicle, adjusted labor hours, and a product quality index) were related to grievances, absence rates, relative wage levels, local unemployment rates, and responses to a 48-question survey on managerial discretion, pace of work, worker and union participation, and the use of teams. The data sets used in even the best UP studies seem spartan in comparison.

Did "more data" break open the black box? The first new challenge the authors faced was a surplus of data, more variables than observations napped with multicollinearity. To deal with this, they resorted to principal components analysis to reduce 48 survey responses to four variables. This raises the hackles of economists, who always go for Colonel Sanders and pass on the McNuggets. Focusing on the results rather than the processing method, one

sees that even with massive amounts of information, it is hard to establish quantitative links between human resource management variables and "bottom line" outcomes. The principal component reflecting management discretion and pace of work was the only variable to be consistently related to the productivity variables. Except for the absence rate, which was related to two productivity variables, the other variables were either only weakly correlated or uncorrelated with productivity.

The message here is not to belittle the final product. The findings on managerial discretion and work pace are a very important contribution to the literature. The point here is simply that new, bigger data sets are not a guaranteed route to success. The key methodological message I received from Katz, Kochan, and Keefe's study is that the linkages between human resources and productivity are very difficult to sort out and that models that try to do the whole job in a single step (equation) may not be up to the job.

An alternative approach to getting inside the black box is that used by studies that focus on a specific mechanism through which unions affect productivity but do not attempt to go further and show how that mechanism is related to productivity in the particular sample being examined. Summaries of selected studies are reported in Table 3; Freeman and Medoff (1984) contains a more comprehensive set of references. These studies have shown that unions are associated with lower turnover, higher absenteeism, less management flexibility in staffing, more work effort, less overall job satisfaction, reduced wage dispersion, greater employee benefits, and less investment in R&D. The findings at this stage seem very robust; each is derived from a number of different data sets using a variety of specifications.

One way of integrating the results of the UP studies with those of studies focusing on intervening variables is illustrated in Figure 1. The figure demonstrates a simple model of how human resource policies affect firm performance. It is not overly dissimilar from the approach used in some textbooks on human resource management. Companies make choices about how they hire, train, pay, and manage their workers. This in turn determines human resource outcomes, as exhibited by easily measured variables such as labor costs and turnover and by not so easily measured variables such as effort and cooperation. The "bottom line" depends on the interaction of human resource outcomes with other firm decisions (e.g., marketing) and the external environment.

The best UP studies attempt to link productivity directly to changes in human resource policies associated with unionization. The studies that focus directly on the intervening variables through which unions influence firm performance in effect attempt to link human resource outcomes to policies. One obvious gap is that our knowledge of how these intervening variables are related to firm performance indicators is very limited. Some progress has been made along these lines in the studies of turnover, absenteeism, and work rules cited in Table 3. The studies of grievance procedures summarized in Ichniowski and Lewin (1987) are also noteworthy in this regard.

Even though the UP studies indicate that human resource policies and outcomes have a large influence on firm performance, the challenge facing the HRF literature is to develop testable hypotheses that will advance the theory well beyond what is presented in Figure 1 and to develop data sources appropriate for testing them. Economic theories about labor markets and employment contracts often focus on decision variables involving selection,

compensation, supervision, and training. Sometimes the models are really designed for welfare analysis (e.g., share economy) or to explain phenomena that seem paradoxical to economists (e.g., wage rigidity). New models or perhaps even the retooling of some existing models could lead to new insights into how firms make hiring and compensation decisions.

In other cases, the empirical implications of the model are quite clear, but appropriate data for empirical testing are not available. More data collection funded by the government, as suggested by Hamermesh (1988), is one route that shows promise. The development of closer linkages between academic economists and human resource practitioners could also help in developing better case studies of single firms and possibly assembling panels of establishment data.

Table 1. How Productivity Changes Under Unionism

Variable	Union Effect	Type of effect (M=wage, N=nonwage)	Impact on Productivity
A. Skill levels			
1. Hiring standards	<ul style="list-style-type: none"> •Raised to offset increased labor costs •Raised to offset restrictions on management's ability to re-assign or terminate 	M N	Positive Positive
2. On-the-job training	<ul style="list-style-type: none"> •Longer tenure of union workers raises payoff to firm from training •Apprenticeship programs encourage broader training in certain trades 	M, N N	Positive Positive
3. Occupational	<ul style="list-style-type: none"> •More use of skilled labor in response to increased labor costs and compressed wage structure •Craft traditions in some trades •More use of skilled labor reduces supervisor-worker ratio 	M, N N M, N	Positive Positive Positive
B. Effort Levels			
1. Incentives for pay and promotion	<ul style="list-style-type: none"> •Compressed wage structure reduces incentives to advance •Pay raises rarely based on merit •Seniority rules restrict ability to promote on merit •Incentive pay plans resisted by many unions 	N N N N	Negative Negative Negative Negative
2. Cooperation among workers	<ul style="list-style-type: none"> •Seniority rules for promotion, job-based pay systems eliminate excessive rivalry and encourage informal on-the-job training 	N	Positive

Table 1. (continued)

Variable	Union Effect	Type of effect (M=wage, N=nonwage)	Impact on Productivity
3. Work rules	<ul style="list-style-type: none"> • Excessive staffing, requirements of unnecessary work, output restrictions, excessive break time 	N	Negative
4. Discipline	<ul style="list-style-type: none"> • Grievance procedures used to protect incompetent or dishonest workers • Supervisors unable to discipline or discharge workers on arbitrary basis 	N	Negative
5. Labor-management communication	<ul style="list-style-type: none"> • Negotiations, grievances open channels for workers to send messages to management • Suggestions more likely when bargaining allows gains to be shared between firm, workers • Workers more willing to use channels in union establishment 	N	Positive
6. Job satisfaction	<ul style="list-style-type: none"> • Workers have greater voice in how workplace is run, increasing morale • Dissatisfaction with union interferes with work • Union creates dissatisfaction where none previously existed 	N	Positive
C. Management			
1. Professionalism	<ul style="list-style-type: none"> • Greater emphasis on policy in making day-to-day decisions • Establish system of production goals and targets, accompanied by regular reviews and meetings with supervisors 	N	Positive
		M, N	Positive

Table 1. (continued)

Variable	Union Effect	Type of effect (R=wage, N=nonwage)	Impact on Productivity
1. Professionalism (continued)	<ul style="list-style-type: none"> • Replacement of plant manager, replacement or re-training of supervisors 	N	Frequently positive
2. Flexibility	<ul style="list-style-type: none"> • Union jurisdictions restrict ability to reassign personnel during slack periods • Seniority rules interfere with staffing especially during layoffs • Contracts limit subcontracting, overtime 	N	Negative
3. Personnel functions	<ul style="list-style-type: none"> • Longer tenure reduces recruiting and hiring expenditures • Applications must be screened more carefully • Hiring halls organize labor market when workers not attached to a single employer 	R, N	Positive
	<ul style="list-style-type: none"> • Higher wages encourage more capital-intensive methods, investment in labor-saving R&D • Work rules prevent use of most efficient technologies • R&D reduced out of fear union will capture all benefits 	R, N	Negative
D. Technology	<ul style="list-style-type: none"> • Higher wages encourage more capital-intensive methods, investment in labor-saving R&D • Work rules prevent use of most efficient technologies • R&D reduced out of fear union will capture all benefits 	N	Positive
	<ul style="list-style-type: none"> • Higher wages encourage more capital-intensive methods, investment in labor-saving R&D • Work rules prevent use of most efficient technologies • R&D reduced out of fear union will capture all benefits 	N	Negative
	<ul style="list-style-type: none"> • Higher wages encourage more capital-intensive methods, investment in labor-saving R&D • Work rules prevent use of most efficient technologies • R&D reduced out of fear union will capture all benefits 	N	Negative

Table 2. Evidence on Union-Nonunion Productivity Differences in the Private Sector

Sample	Type of Data	Output Measure	Results	Source
Manufacturing, 1972-1977	State by industry aggregates	Value added	1972: 10 to 25% 1977: 31	Brown and Medoff (1978) Freeman and Medoff (1984)
Manufacturing, 1970-1980	Lines of business in large corporations	Value added	-2	Clark (1984)
Manufacturing, 1983	Establishments	Value added	-32	Bemmelis (1988)
Home household furniture, 1974	Establishments	Value added	15	Frantz (1976)
Cement, 1973-1976	Establishments	Tons	7 to 10	Clark (1980a)
Cement, 1953-1976	Before-after comparisons of six establishments	Tons	6 to 8	Clark (1980b)
Auto parts, 1982	Establishments	Value added	2	Kaufman and Kaufman (1987)
Bituminous coal, 1965-1980	Establishments	Tons	1965: 33 to 38 1970: -4 to 8 1975: -20 to -17 1980: -18 to -14	Connerton, Freeman and Medoff (1983)
Construction, 1972-1982	State by industry aggregates	Value added deflated by price or cost index	1972: 17 to 22 1977: 8 1982: 6	Allen (1984a, 1988a)
Commercial office buildings, 1974	Structures	Square footage	36 to 38	Allen (1986a)

Table 2. (continued)

Sample	Type of Data	Output Measure	Results	Source
Elementary and secondary schools, 1972	Structures	Square footage	1 to 4	Allen (1986a)
Private hospitals and nursing homes, 1976	Structures	Square footage	23	Allen (1986b)
Public hospitals and nursing homes, 1976	Structures	Square footage	2	Allen (1986b)
Retail stores and shopping centers, 1977	Structures	Square footage	51	Allen (1988b)
Commercial banking, 1978	Establishments	Lending products	-11	Graddy and Hall (1985)

Table 3. Evidence on Sources of Union-Nonunion Productivity Differences

Variable	Results	Source
Turnover	Voluntary quits are 50 to 100 percent lower among union members.	Freeman (1980a)
Absence rate	Absence rates are 30 to 40 percent higher among union members.	Allen (1984b)
Management flexibility	Union and nonunion establishments in manufacturing have equal flexibility in adjusting capital-labor ratios, but union establishments have less flexibility in adjusting ratio of production to nonproduction labor.	Freeman and Medoff (1982)
	Union and nonunion construction contractors and subcontractors have equal flexibility in substituting capital and materials for labor, but union contractors have less flexibility in substituting supervisory and unskilled labor for skilled labor. Results in excess staffing of 3%, excess costs of 2%.	Allen (1986c)
Work effort	Union members report greater work effort, more difficulty in getting a couple of hours off work, less choice in how they can do work, and less ability to refuse overtime without penalty.	Duncan and Stafford (1980)
Job satisfaction	Union members report more satisfaction with bread-and-butter aspects, but less satisfaction with promotions, supervisors, job content, and resource adequacy. Overall levels of job satisfaction are lower for union workers.	Kochan (1979), Freeman (1978)

Table 3. (continued)

Variable	Results	Source
Wage dispersion	Union wage policies reduce wage dispersion within and across establishments.	Freeman (1980b, 1982)
Employee benefits	Unionized establishments more likely to have pensions, health insurance, overtime premiums, and shift differentials, whereas they are less likely to have bonuses.	Freeman (1981)
R&D	Retired union workers receive larger benefits upon retirement and larger benefit increases after retirement. Union workers retire earlier, allowing them to collect benefits over a longer period.	Allen and Clark (1986)
Investment	Firms in highly unionized industries invest less intensively in R&D and R&D adds relatively less to the market value of such firms.	Connolly, Hirsch, and Hirschey (1986)
Investment	Unionized firms invest less in capital	Bronars and Deere (1987), Hirsch (forthcoming)

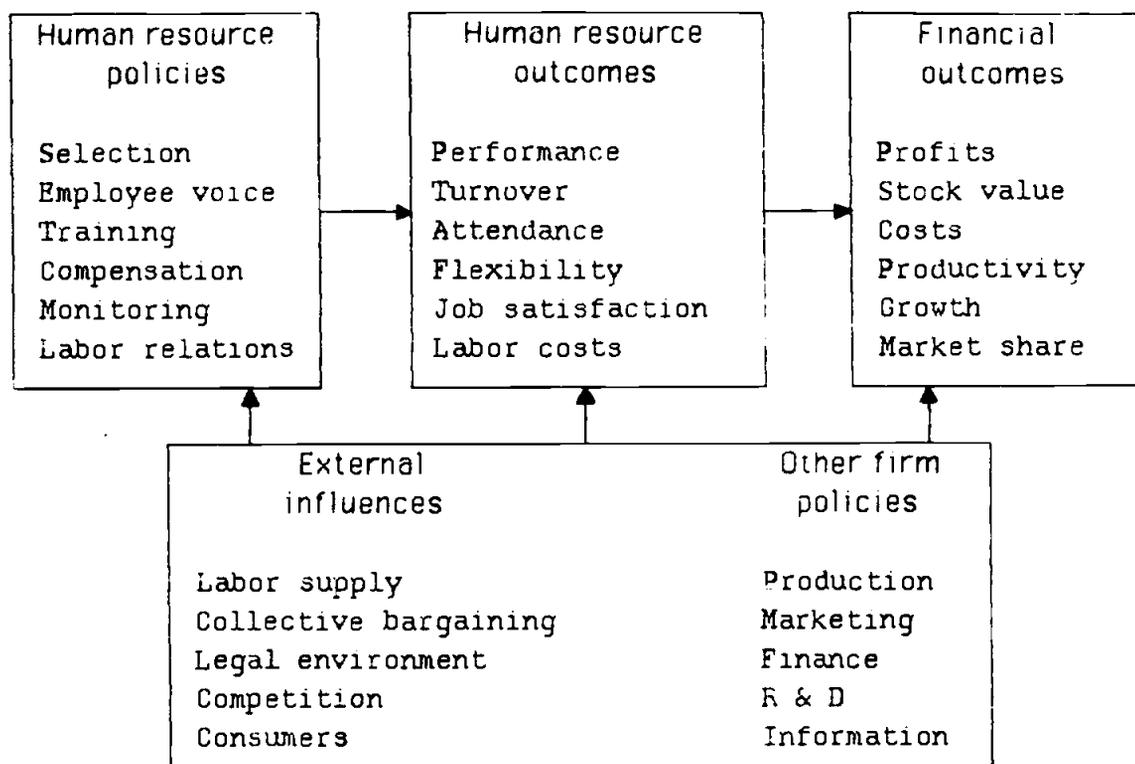


Figure 1. Model of human resource policies and firm performance

REFERENCES

- Abraham, Katharine G., and Medoff, James L. "Length of Service and Promotions in Union and Nonunion Work Groups." Industrial and Labor Relations Review 38 (April 1985): 408-420.
- Addison, John T., and Hirsch, Barry T. "Union Effects on Productivity, Profits, and Growth: Has the Long Run Arrived?" Journal of Labor Economics 7 (January 1989): forthcoming.
- Allen, Steven G. "Unionized Construction Workers Are More Productive." Quarterly Journal of Economics 99 (May 1984): 251-274 (a).
- "Trade Unions, Absenteeism, and Exit-Voice." Industrial and Labor Relations Review 37 (April 1984): 331-345 (b).
- "Unionization and Productivity in Office Building and School Construction." Industrial and Labor Relations Review 39 (January 1986): 187-201 (a).
- "The Effect of Unionism on Productivity in Privately and Publicly Owned Hospitals and Nursing Homes." Journal of Labor Research 7 (Winter 1986): 59-68 (b).
- "Union Work Rules and Efficiency in the Building Trades." Journal of Labor Economics 4 (April 1986): 212-242 (c).
- "Declining Unionization in Construction: The Facts and the Reasons." Industrial and Labor Relations Review 41 (April 1988): 343-359 (a).
- "Further Evidence on Union Efficiency in Construction." Industrial Relations 27 (Spring 1988): 232-240 (b).
- Allen, Steven G., and Clark, Robert L. "Unions, Pension Wealth, and Age-Compensation Profiles." Industrial and Labor Relations Review 39 (July 1986): 502-517.
- Bemmels, Brian. "Managerial Efficiency, Unions, and Productivity at Manufacturing Plants." Mimeograph. Edmonton, Alberta: University of Alberta, 1988.
- Bronars, Stephen G., and Deere, Donald R. "Union Threats, Unionization, and Firm Behavior: A Decision Event Study." Mimeograph. Santa Barbara, Cal.: University of California, 1987.
- Brown, Charles, and Medoff, James L. "Trade Unions in the Production Process." Journal of Political Economy 86 (June 1978): 355-378.
- Clark, Kim B. "Unionization and Productivity: Micro-Econometric Evidence." Quarterly Journal of Economics 95 (December 1980): 613-639 (a).

----- . "The Impact of Unionization on Productivity: A Case Study." Industrial and Labor Relations Review 33 (July 1980): 451-479 (b).

----- . "Unionization and Firm Performance." American Economic Review 74 (December 1984): 893-919.

Connolly, Robert A.; Hirsch, Barry T.; and Hirschey, Mark. "Union Rent Seeking, Intangible Capital, and Market Value of the Firm." Review of Economics and Statistics 68 (November 1986): 567-577.

Connerton, Marguerite; Freeman, Richard B.; and Medoff, James L. "Industrial Relations and Productivity: A Study of the U.S. Bituminous Coal Industry." Mimeograph. Cambridge, Mass.: Harvard University, 1983.

Duncan, Greg J., and Stafford, Frank P. "Do Union Members Receive Compensating Wage Differentials?" American Economic Review 70 (June 1980): 355-371.

Ehrenberg, Ronald G., and Milkovich, George T. "Compensation and Firm Performance." In Human Resources and the Performance of the Firm, edited by M.M. Kleiner et al. Madison, Wis.: Industrial Relations Research Association, 1987.

Frantz, John R. "The Impact of Trade Unions on Production in the Wooden Household Furniture Industry." Senior honors thesis, Harvard College, 1976.

Freeman, Richard B. "Job Satisfaction as an Economic Variable." American Economic Review 68 (May 1978): 135-141.

----- . "The Exit-Voice Tradeoff in the Labor Market: Unionism, Job Tenure, Quits, and Separations." Quarterly Journal of Economics 94 (June 1980): 643-674 (a).

----- . "Unionism and the Dispersion of Wages." Industrial and Labor Relations Review 34 (July 1980): 3-23 (b).

----- . "The Effect of Unionism on Fringe Benefits." Industrial and Labor Relations Review 34 (July 1981): 489-509.

----- . "Union Wage Practices and Wage Dispersion Within Establishments." Industrial and Labor Relations Review 36 (October 1982): 3-21.

Freeman, Richard B., and Medoff, James L. "Substitution between Production Labor and Other Inputs in Unionized and Nonunionized Manufacturing." Review of Economics and Statistics 64 (May 1982): 220-233.

----- . What Do Unions Do? New York: Basic, 1984.

Graddy, Duane B., and Hall, Gary. "Unionization and Productivity in Commercial Banking." Journal of Labor Research 6 (Summer 1985): 249-262.

Hamermesh, Daniel S. "Data Difficulties in Labor Economics." National Bureau of Economic Research Working Paper No. 2622. Cambridge, Mass.: NBER, 1988.

- Hirsch, Barry T. "Innovative Activity, Productivity Growth, and Firm Performance: Are Labor Unions a Spur or a Deterrent?" In Advances in Applied Microeconomics, Vol. 5, edited by Albert N. Link and V. Kerry Smith. Greenwich, Conn.: JAI Press, forthcoming.
- Hirschman, Albert O. Exit, Voice, and Loyalty. Cambridge, Mass.: Harvard, 1970.
- Ichniowski, Casey, and Lewin, David. "Grievance Procedures and Firm Performance." In Human Resources and the Performance of the Firm, edited by M.M. Kleiner et al. Madison, Wis.: Industrial Relations Research Association, 1987.
- Katz, Harry C.; Kochan, Thomas A.; and Keefe, Jeffrey H. "Industrial Relations and Productivity in the U.S. Automobile Industry." Brookings Papers on Economic Activity (1987:3): 685-728.
- Kaufman, Robert S., and Kaufman, Roger T. "Union Effects on Productivity, Personnel Practices, and Survival in the Automotive Parts Industry." Journal of Labor Research 8 (Fall 1987): 333-350.
- Kleiner, Morris M.; Block, Richard N.; Roomkin, Myron; and Salsburg, Sidney W., eds. Human Resources and the Performance of the Firm. Madison, Wis.: Industrial Relations Research Association, 1987.
- Kochan, Thomas A. "How American Workers View Labor Unions." Monthly Labor Review 102 (April 1979): 15-22.
- Kochan, Thomas A.; Katz, Harry C.; and McKersie, Robert B. The Transformation of American Industrial Relations. New York: Basic, 1986.
- Lewin, David, and Feuille, Peter. "Behavioral Research in Industrial Relations." Industrial and Labor Relations Review 36 (April 1983): 341-360.
- Lewis, H. Gregg. Union Relative Wage Effects: A Survey. Chicago: University of Chicago Press, 1986.
- Salkever, David S. "Unionization and the Cost of Producing Hospital Services." Journal of Labor Research 3 (Summer 1982): 311-33.
- Slichter, Sumner H.; Healy, James J.; and Livernash, E. Robert. The Impact of Collective Bargaining on Management. Washington: Brookings Institution, 1960.
- Sloan, Frank A., and Adamache, Killard W. "The Role of Unions in Hospital Cost Inflation." Industrial and Labor Relations Review 37 (January 1984): 252-262.