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TRADE UNIONS AND PRODUCTIVITY:  
SOME NEW EVIDENCE ON AN OLD ISSUE

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ABSTRACT

This paper summarized some new evidence concerning the impact of collective bargaining on productivity for workers of a given quality working with the same amount of capital. The new findings, which are based on econometric investigations, indicate that in many sectors, in particular manufacturing and construction, unionized work places are on average more productive than those that are nonunion. This positive union productivity effect is not an immutable constant. For example, in the underground bituminous coal industry, unionized mines were significantly less productive than nonunion mines in 1975 although they were significantly more productive in 1965.

The routes by which unions affect productivity have not yet been carefully delineated, and they appear to differ from sector to sector. In manufacturing, reduced turnover and improved management seem to be key; in construction, better trained workers and more rationalized hiring and supervision seem to be primary.

Finally, while the union/nonunion productivity differential is likely to be positive, it is on average not large enough to offset the greater compensation and capital intensity under unionism. Hence, higher productivity and lower profitability appear to go hand in hand under collective bargaining.

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The impact of trade unionism on productivity has long been one of the major bones of contention among analysts of unionism. As Derek Bok and John Dunlop wrote in 1970: "For more than a century and a half, economists have debated the effects of 'combinations of workmen,' or collective bargaining, on the efficiency of business enterprises. The literature is replete with conflicting appraisals of the impact of work stoppages, work rules, regulation of machinery, apprenticeship, and training on employee efficiency and managerial decisions."<sup>1</sup>

Do unions decrease or increase labor productivity? According to standard economic theory, unions raise wages and management responds by increasing the capital intensity of its work place and the "quality" of its work force, which increases the productivity of labor. This "productivity effect" of unions is accepted by most discussants of the issue at hand. The real controversy arises when the question becomes: Controlling for differences both in the amount of capital labor has to work with and in labor quality, is productivity higher or lower in workplaces which are unionized? That is, if we compare union and nonunion workplaces which are identical in terms of their productive inputs, does collective bargaining lead to human resources practices which increase or decrease productivity?

This paper summarizes some new evidence concerning the latter question of workers of the same skill and using the same capital. The first section lays out two opposing views of the issues: one which focuses on "the union wage (or more accurately, wages plus fringes) effect" and management responses to it, and one which focuses on the non-wage effects of unionism. Section II describes how a standard tool of economic theory and econometrics -- the

production function -- has been used to help analyse the question while section III summarizes the results of the production function investigations. In the fourth section we turn from the level of productivity to its growth. The evidence presented indicates that whatever unions do, they are not preventing firms either from adopting new technologies, or from taking the other steps which cause productivity to grow. In the fifth section we take a glimpse inside the black box which links trade unions and productivity. While we cannot identify all of the factors at work, we can offer evidence on some important ones.

#### I. "Monopoly" and "Voice/Response" Effects

We have argued elsewhere that unions have two types of effects: "monopoly" effects and "voice/response" effects.<sup>2</sup> The monopoly effects deal with unions' impact on the level of employee compensation (wages plus fringes), and the ramifications of union-induced changes in that level; the voice/response effects deal with what unions do once their monopoly effects have been netted out (see Figure 1). According to the monopoly model, firms respond to unionism by altering capital (and other inputs) per worker and improving the quality of labor until the contribution of the last unit of labor just equals the union wage rate. While under some circumstances unions may use their monopoly power to lower productivity through restrictive work practices, competition in product markets is unlikely to permit such practices for very long except in markets sheltered from competition. An employer who pays a higher cost of labor and gets less rather than more productivity out of his workforce will go out of business in a competitive product market.



While the monopoly model predicts that unionized firms will have higher productivity than otherwise comparable nonunion firms, it is important to realize that the monopoly-wage induced gain in productivity is socially harmful. In the absence of other interferences with perfect competition, the wage effect causes labor and capital to be allocated in such a way that their contribution to national output is not as high as it would be if competitive market prices determined where these factors were being utilized. Workers who would have been employed in the union sector are forced to take lower productivity jobs in the nonunion sector. Machines that would have been employed in nonunion enterprises are now used in the union sector to raise the productivity of unionized labor. And the size of the union sector is smaller than it would have been in the absence of union monopoly wages. The social cost of union monopoly wage gains can be interpreted as an estimate of the lost productivity due to the set of monopoly effects associated with unionism.

The voice/response routes by which collective bargaining raises productivity are, by contrast, potentially socially desirable, since they result not from inefficient allocation of resources but from improved efficiency within firms. For example, reductions in turnover due to unionism raise productivity by lowering costs of training and recruitment.<sup>3</sup> In industries like construction productivity gains result from unionized apprenticeship programs that produce better workers. Managerial responses to unionism that take the form of more rational personnel policies and more careful monitoring of work activity raise productivity by reducing organizational slack. The voluminous case studies by Harvard Business School's Sumner Slichter, James Healy, and Robert Livernash and by other

researchers have shown the effectiveness of the managerial response to unionism is perhaps the most important determinant of what unions do to productivity. Some managements will adjust to the union and turn unionism into a positive force at the workplace; others will not. Over the long run, those that respond positively will prosper while those that do not will suffer in the market.<sup>4</sup>

Just as the monopoly analysis allows for the possibility that restrictive work rules reduce productivity, the voice/response analysis allows for the possibility that some work rules, such as seniority or rules restricting managerial flexibility, can reduce productivity. Perhaps most importantly, the voice/response analysis points to the "state of industrial relations" in a sector as a key factor in either raising or reducing productivity. If industrial relations are good, with management and unions working together to produce a bigger "pie" as well as fighting over the size of their slices, productivity is likely to be higher under unionism. If industrial relations are poor, with management and labor ignoring common goals to battle one another, productivity is likely to be lower under unionism.

The empirical question is whether productivity-augmenting or productivity-reducing behavior dominates in the economy.

## II. Union Productivity Effects: Theory and Evidence

The new tool used to study the impact of unionism on productivity is the production function, which traditionally makes output per worker depend on capital per worker, other inputs used per worker, and indicators of the quality of the workers (as reflected in their level of schooling, for

instance). To determine the effects of unionism on productivity, one adds to the traditional variables a variable giving the fraction of the work force that is unionized. In statistical analyses the estimated effect of the fraction unionized reflects what unions do to productivity above and beyond changes in the amount of physical inputs used per worker. To isolate the union effect in this framework, one must have good measures of output, capital, and the quality of labor, and one must specify properly the nature of the production relation itself.

Table 1 summarizes the results of studies using the production function technique on the relation between unionism and productivity. As the table shows, the studies differ in their measures of labor productivity, with some measuring it as dollars of value added (or shipments) per worker and others in physical units (tons, square feet) per worker. Value added is a dollar measure (price times quantity) that has the advantage of including the full spectrum of goods produced by a firm, valued at their market prices. It also has a disadvantage, however: unless the prices charged by union and nonunion firms are the same, any finding of higher value added per worker in the organized establishments could reflect not the higher physical output per worker, but rather a higher price per unit of output. In industries where markets are truly national, with a single price for each output, and where unionized and nonunionized firms are equally likely to specialize in high-priced or in low-priced outputs, the possible confusion of price with quantity is small, but in industries where markets are partly local, it could lead to misleading inferences. Physical measures of output alleviate this problem but



Table 1  
Productivity Function Estimates of the Union Productivity Effect

Studies Using Value Added or Shipments (Sector, Unit of Comparison, Year)	Estimated Difference in Productivity (with Amount of Capital per Worker, Other Factors Held Fixed) between Union and Nonunion Units
1. Manufacturing Industries, States	Percent
1972A	20 to 25; 10 to 15
1972B	10
1977	27
Changes between 1972 and 1977	9
2. Wooden Household Furniture, Plants, 1975-1976	15
3. Construction, (revenue Deflated by Area Price Index, States, 1972-1975)	19 to 25
4. Office Building Construction (revenue Deflated by Area Price Index), General Contractors, 1974	38
5. Manufacturing, Individual Businesses, 1980	-2
Studies of Physical Units of Output (Sector, Unit of Comparison, Year)	
6. Cement (Tons), Plants, 1974	6 to 8
7. Cement (changes in tons), Plants that Went from Nonunion to Union, 1953-76	6
8. Underground Bituminous Coal (tons), Mines	
1965	25 to 30
1970	-10 to 5
1975	-25 to 20
1980	-15 to 20
9. Construction (Square Feet), Projects, 1974	32
<u>SOURCES:</u> (1) 1972A: C. Brown and J. Medoff, "Trade Unions in the Production Process," <i>Journal of Political Economy</i> 86, no. 3 (June 1978): 355-78; 1972B and 1977: Estimated with Jonathan Leonard from data based on Census of Manufacturers. (2) J. Frantz, "The Impact of Trade Unions on Productivity in the Wood Household Furniture Industry" (Undergraduate thesis, Harvard University, 1976). (3) and (9) S. Allen, "Unionized Construction Workers Are More Productive" (North Carolina State University, 1981, mimeographed). (4) S. Allen, "Unionization and Productivity in Office Building and School Construction" (North Carolina State University, 1983, mimeographed), 27-30. (5) K. Clark, "Unionization and Firm Performance: The Impact on Profits, Growth and Productivity": National Bureau of Economic Research Working Paper No. 990 (1982). (6) and (7) K. Clark, "The Impact of Unionization on Productivity: A Case Study," <i>Industrial and Labor Relations Review</i> 34 (July 1980): 466. (8) M. Connerton, R. B. Freeman, and J. L. Medoff, "Industrial Relations and Productivity: A Study of the U.S. Bituminous Coal Industry" (Harvard University, 1983 revision, mimeographed).	

at the cost of being limited to the few distinct goods that can be so measured. Most modern firms produce a wide variety of products with too many dimensions to be captured by a single physical measure. Because neither measure is perfect, researchers have analyzed both value-added and physical measures of labor productivity.

The first study, by Professor Charles Brown of the University of Maryland and James Medoff, compared value added per worker across states in the same industry, and found that, with other factors (including capital per worker) the same, productivity was 20 to 25 percent higher in the more heavily unionized states. They also found, however, that unionized firms used more capital per worker than predicted in the analysis, a fact that suggests that they have not perfectly modelled the production process. Because the estimated union effect depends critically on how capital affects output, they report lower figures of 10 to 15 percent under various assumptions regarding the productivity of capital. Follow-up work for manufacturing (the authors and Professor Jonathan Leonard of the University of California, Berkeley) has produced a smaller positive union productivity effect than Brown and Medoff for 1972, using a different measure of capital, but a larger effect of 1977. Analysis focused on a single manufacturing industry, wooden household furniture, yielded an estimate of 15 percent higher productivity in union than in non-union plants. In construction, Professor Steven Allen of North Carolina State University has estimated union-nonunion productivity differences in value added (deflated by an area price index, to deal with the danger that in this sector the higher value added reflects higher prices of union built buildings) ranging from 17 percent to 22 percent. Not all value

added studies have, however, obtained positive union productivity effects. In a study of productivity in "businesses," defined as parts of certain large firms that can be considered separate, Professor Kim Clark of the Harvard Business School found a slight negative union impact. Clark's findings make it clear that the production function technique can yield negative as well as positive union impacts and that the union effect is likely to differ across different parts of the economy -- a point to which we will return later.

Analyses of physical productivity, summarized in the bottom half of the table, have in two cases found positive union effects and in one case found an effect that went from positive to negative over time. Clark estimated that productivity in cement was 6 to 8 percent higher in organized than in nonorganized plants in 1974. In construction, Allen obtained data from the U.S. Department of Labor on 83 office building projects and found that, measured by square feet constructed per worker, the union projects had 11 percent to 39 percent higher productivity. Consistent with Allen's finding of higher productivity in union construction, two case studies that examined labor usage in the bids of union and nonunion contractors for identical buildings found that union contractors estimated a need for 20 to 25 percent fewer workers for the project than were needed by nonunion contractors.<sup>5</sup> Finally, our analysis (in conjunction with Marguerite Connerton of the U.S. Department of Labor) of tons of coal produced in underground bituminous coal mines (virtually all underground tonnage in the United States was captured) yielded quite different results in different time periods: positive union productivity effects in 1965, small positive to small negative effects in 1970, sizable negative effects in 1975, and smaller negative effects in 1980.

The switch in the union effect from positive to negative shows that the union productivity effect is highly variable over time, dependent on labor and management policies and relations, which can improve or deteriorate.

Two of the studies in Table 1 used a before-after method of analysis, examining the relation between changes in productivity and changes in unionism. Both found productivity increasing with the advent of unionism. In analysis of 1972-1977 changes in manufacturing productivity, we and Leonard obtained a positive but statistically insignificant union effect, which showed that productivity did better in areas where unionism grew more (declined less) but not by a well-defined magnitude. Clark compared productivity in six cement plants that went union in the 1960s and found increases in productivity of 6 to 8 percent.

While the bulk of the work has focused on the U.S., an analysis for Japanese manufacturing yielded results comparable to those in the original Brown-Medoff study. For 1973, Muramatsu found a positive but insignificant union productivity effect of 5 percent in Japanese manufacturing. For 1977 we found that the unionized parts of Japanese manufacturing had a 19 percent productivity advantage. The difference in results between the years may be due to data problems or to differences over time in the relevant set of intervening union effects.

In sum, most studies of productivity find that unionized workplaces are more productive than otherwise comparable nonunion workplaces. Because unionized labor costs are also higher, however, one should not infer from this that firms should be eager to be organized. Statistical evidence indicates that the productivity increases cannot offset the greater capital intensity and labor costs under unionism. Higher productivity does not mean a higher rate of return on capital.<sup>6</sup>

### III. Unions and the Growth of Productivity

While unions may have a positive effect on productivity at a given point in time, they may cause productivity to decline over time. This would happen if unions prevented firms from adopting new technologies; it would also happen if unions led to a retardation in the growth rate of capital.

Historically, some unions have opposed technological change. "The Window-Glass Workers, with a strong craft tradition, tried to prevent the use of glassworking machines when they were introduced in 1908...In time, however, the new processes displaced the old, since they were much more efficient, and the window-glass union had to be formally disbanded in 1928. Other unions have endorsed practices such as rigid piece rates which reduce the economic benefits of technological change to employers."<sup>7</sup>

Because unions that oppose technological change tend to go out of business, the general union attitude toward technological change is not one of stubborn opposition. While not all unions encourage technological change to the extent that John L. Lewis' Mine Workers did in the 1950s and 1960s (when the UMW favored rapid mechanization of the mines, high productivity, and high wages, at the expense of employment), many unions view change favorably -- as long as they can protect their members against serious harm. In the 1980s, as well as earlier, indeed, some unions have even pressed management to modernize their plants with new investments, as they realize that failure to do so means ultimate loss of jobs.<sup>8</sup>

Union policy toward technological change, whether pro or con, however, is not the only determinant of the impact of organization on productivity growth. Union wage increases may themselves speed up the rate of "technological

advance" by inducing management to substitute new machinery for labor or by inducing management to pay for the development and introduction of new technologies. On the other hand, however, high wages reduce profitability of the union sector, discouraging further investments in the area.

To see unionism is positively or negatively related to the growth of productivity, as opposed to the level of productivity, we have analyzed the impact of the proportion of workers unionized on the rate of growth of value added or value of shipments in three data sets. The results of our analysis, which are summarized in Table 2, suggest that while highly unionization industries have, indeed, had somewhat slower growth of productivity than low unionized industries, the observed relation is too weak statistically to support any conclusion that unionism reduces dynamic efficiency. Some highly unionized industries have rapid productivity growth while others have less rapid growth. Because unionized sectors tend to be "older" industries, one expects some negative relation between productivity and unionism because of the life cycle of industries (a new industry typically enjoys more rapid productivity growth than an older established sector) even if unionism did nothing harmful to the rate of industrial progress. Consistent with our results, analysts of the relationship between productivity growth and research and development spending that includes unionism as a "control variable" shows no clear pattern, with negative relationships between the fraction organized and growth of productivity in some periods and positive relationships in other periods.<sup>9</sup> On the other hand, a recent study by Hirsch and Link of the growth of total factor productivity between 1957 and 1973 in 192-digit nonunionized industries yielded a negative significant coefficient on both a unionism variable and a change in unionism variable. Over all, current empirical evidence offers no support for the bald assertion that unionization is associated with lower (or higher) productivity advance but suggests the value of further work.

Table 2

## Unionism and Growth of Productivity in Manufacturing

Measure of Productivity, Years Analyzed	Estimated Effect of Unionism on Growth of Productivity per Worker per Year
1. Value Added per Worker in 176 Industries, 1958-76	Insignificant Negative Effect of $-.4$ Percentage Points with Average Growth of 2.0 Percentage Points
2. Value of Shipment in 450 Industries, per Unit of Labor and Capital, 1958-78	Insignificant Negative Union Effect of $-.3$ Percentage Points with Average Growth of 0.7 Percentage Points
3. Value Added per Production Worker Hour, State by Industry Cells, 1972-77	Insignificant Negative Union Effect of $-.3$ Percentage Points with Average Growth of 1.2 Percentage Points

SOURCES: (1) Calculations use the Annual Survey of Manufactures, conducted by the U.S. Census Bureau, as described in R. B. Freeman, "Unionism, Price-Cost Margins and the Return to Capital": National Bureau of Economic Research Working Paper No. 6642 (1983). (2) Calculated with Wayne Gray, using shipments data from various volumes of the Annual Survey of Manufacturers and the Census of Manufactures, conducted by the U.S. Census Bureau. (For discussion of both of these data sources, see Appendix.) (3) Calculated from 1972 and 1977 Census of Manufactures data. Value added deflated by GNP.

### The Recent Slowdown in Productivity Growth

The claim that productivity has historically grown more rapidly in periods of lower organization of the workforce is simply false. The U.S. economy has enjoyed rapid growth of productivity in periods of relatively weak unionization (the 1900s, for example) and rapid growth in periods of strong unionization, notably the decades immediately following the Second World War. While so much changes over time that it would be foolhardy to read any causality into historical associations, the fact is that in both the post-World War II period and over a longer period stretching back to 1900, (war years and the Great Depression years excluded) there is essentially no connection between productivity growth in the United States and unionization. In a year when unionization has been above average, rates of growth of productivity have been above average, while in years when unionization has been below average, so too have rates of growth of productivity (see Table 3). While it is still possible that union-induced changes in the overall economy are inimical to rapid productivity growth, the historical data do not show such a pattern.

### IV. A Glimpse Inside the Black Box

The impact of collective bargaining on productivity is not an immutable constant. In fact, the impact appears to depend greatly on both the "internal climate" of a workplace and the "external climate" in which management and labor operate. We have seen that in many settings unions have a positive impact on productivity, even after the "monopoly" effects of the institution are netted out. Isn't this finding inconsistent with what managers say unions



Table 3

## Productivity Growth and Unionization Over Time

	1950-80	
	Rate of Change in Output per Worker Above Median	Rate of Change in Output per Worker Below Median
Unionization Above Median	8	7
Unionization Below Median	7	8
	1900-80	
	Rate of Change in Output per Worker Above Median	Rate of Change in Output per Worker Below Median
Unionization Above Median	13	13
Unionization Below Median	13	13

**SOURCE:** Calculated by computing median levels of unionization and rate of change in output per worker in each period, and comparing unionization and rate of change in output per worker to their medians. Unionization figures are from U.S. Bureau of Labor Statistics. Output per worker data are from U.S. Department of Labor, Monthly Labor Review, various editions, and from U.S. Department of Labor, Historical Statistics of the U.S. (Washington, D.C.: U.S. Government Printing Office, 1957).

do? What precisely are the channels through which unions affect productivity? A black box which takes unionism and transforms it into greater productivity net of capital intensity and labor quality would be much more credible if its workings were understood.

#### Management Flexibility Under Unionism

That unions reduce managerial flexibility is one of the most frequent charges brought against unions by managers. Jurisdictional limitations on what workers can and cannot do; restrictions on the activity of foremen and other nonunion workers to perform the work of members in the bargaining unit; restrictions on contracting work out; insistence on operating by the rules even when it may be more efficient to break them are all different ways in which unions impair managerial flexibility.

To evaluate the impact of unionism on the flexibility of operations we have examined the degree to which union and nonunion management substitute nonproduction labor and capital for production labor when the relative costs of the latter change. If unionism reduces flexibility, the extent of such cost-minimizing substitution is likely to be less in a unionized setting. Our analysis of substitutability between production and nonproduction labor among industries and among plants within industries show that unionism is associated with less substitutability between production and nonproduction labor but not between production labor and capital. We estimate that a 10 percent increase in the wage of production workers relative to the wage of nonproduction workers causes a 1.9 percent substitution of nonproduction for

production labor in a union setting compared to a 2.8 percent substitution in a nonunion setting.<sup>11</sup>

Even substantial reductions in flexibility are, however, unlikely to have a great effect on productivity. When production lines are machine-run, flexibility is simply not important. When operations are more amenable to managerial decisions, the good manager can substitute better advance planning for flexibility. Perhaps most importantly, flexibility -- defined in terms of the substitutability among inputs in a production function -- is a second order rather than first order factor in affecting the level of productivity.<sup>11</sup> In the construction industry, where complaints about restrictive union work rules are commonplace, experts in the economics of the industry almost uniformly agree that the rules' effect on productivity has been vastly exaggerated:<sup>12</sup>

"relatively few union workers are covered by contracts of this nature"

"...their (work rules) adverse effect is much less than has been widely alleged"

"Although no reliable quantitative estimate can be made of those rules on efficiency, their total impact would appear to be very small"

"There is no question that at various times and places, various locals of the building trades unions have resisted technological innovation in tools or materials and have established unduly restrictive work rules or practices. Yet, the results of our survey, as of other field research, do not support the contention that this has been a widespread or consistent policy."

All told, reductions in flexibility, while irritating to management, have only modest effects on productivity.

### Some Positive Channels

Suppose the reduction in productivity due to reduced management flexibility has been oversold. In what ways does unionism in fact raise productivity and by how much?

These are extremely difficult questions to answer, for they require knowledge not only of differences in the characteristics of organized and unorganized workplaces but also of the actual ways in which the workplaces operate. Our current knowledge suggests that several factors underlie the union-productivity linkage. In manufacturing, the fact that unions substantially reduce quit rates appears to explain some of the union productivity effect. Brown and Medoff estimated that one-fifth of the union/nonunion productivity differential in the average manufacturing industry was attributable to the lower turnover under unionism. Muramatsu found that all of the 1978 Japanese union effect on productivity was to to lower quits. In construction, Allen attributed 10 percent of the union productivity advantage to the reduced need for supervision under unionism; and 8 percent to the greater use of standardized components by union contractors.<sup>13</sup> In the cement industry, Clark found some changes in worker behavior likely to raise productivity (lower turnover in half of the plants studied, and, according to the union, improved morale in two of six), but he found the most important changes in managerial performance (Table 4). In every plant which became unionized, top management replaced the plant manager and many foremen and introduced more professional managerial practices, weeding out authoritarian or paternalistic practices. Supervisors "tightened the ship," "kept a close eye on things," and introduced

Table 4

## Responses to Unionism in Six Cement Plants

Worker Responses	Number of Plants with Changes in Behavior
Turnover	In three plants, turnover down. In two plants, no change in turnover. In one plant, turnover rises.
Absenteeism	In two plants, absenteeism increases.
Discipline problems	In one plant, discipline problems increase. In one plant, discipline problems decrease.
Morale	Union reports improvement in three plants; management reports improvement in one, no change in one, worse in one.
<b>Management Responses</b>	
Plant Manager	Six plants replace plant manager.
Supervisors	Six plants replace supervisors.
<b>Management Practices</b>	
Before Union	One plant rated management practices "professional." Three plants rated as "authoritarian." One plant rated as "authoritarian" or "paternalistic." One plant rated as "paternalistic."
After Union	Three plants report major improved methods of management: productivity targeting; performance review meetings; periodic meetings with workers; introduction of standards; new reporting and accounting systems; better supervisor/worker relations.  Two plants report minor improvements: more formalized contract procedures; changes in way supervisors deal with people; gradual changes in system of monitoring performance.  One plant reports little change: only difference is in supervisor/worker relations.

SOURCE: K. Clark, "The Impact of Unionization on Productivity: A Case Study," Industrial and Labor Relations Review (July 1980): 451-68.

new modes of operation likely to raise productivity. This finding gains credence from the fact that it is similar to the central conclusion of Slichter, Healy, and Livernash in The Impact of Collective Bargaining on Management that "The challenge that unions present management has, if viewed broadly, created superior and better balanced management, even though some exceptions must be recognized."<sup>14</sup>

In some industries productivity is advanced by explicit labor-management cooperative ventures. In the men's tailored clothing industry, for example, labor and management established a committee to develop and introduce automatic sewing machines to enable U.S. workers and firms to compete with low wage foreign competitors, hiring Draper Laboratories, formerly a part of the Massachusetts Institute of Technology, to do the technical work. According to John T. Dunlop,

The program has several distinct features. The Department of Commerce is contributing financially, although no more than the private-sector contributions from labor and management. The managements and the union in the clothing industry have been joined by two leading textile manufacturers and a leading synthetic yarn company to constitute a broad sectoral group to improve coordination and productivity improvements. These joint responses of labor and management are beyond those that could be achieved at the work place.<sup>15</sup>

While joint efforts are relatively uncommon, increased pressures from foreign competitors may induce other industries and unions to engage in similar cooperative activities in the future.

#### V. The Union Productivity Effect Across Climates

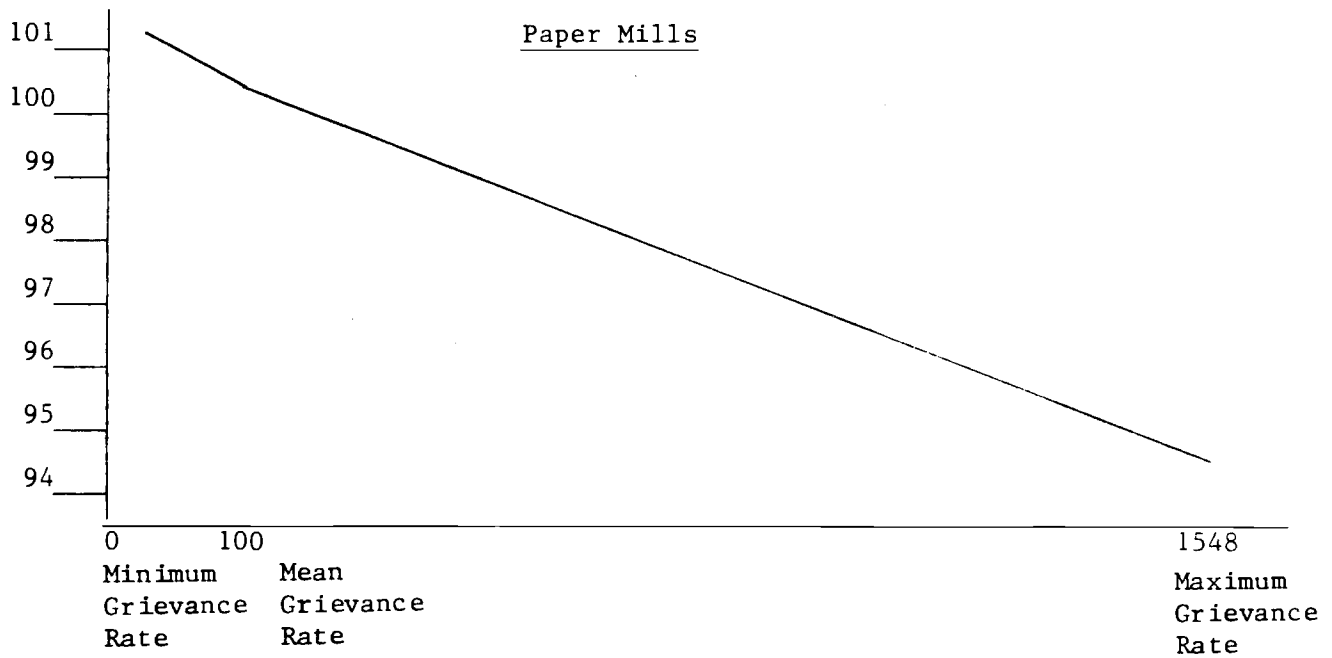
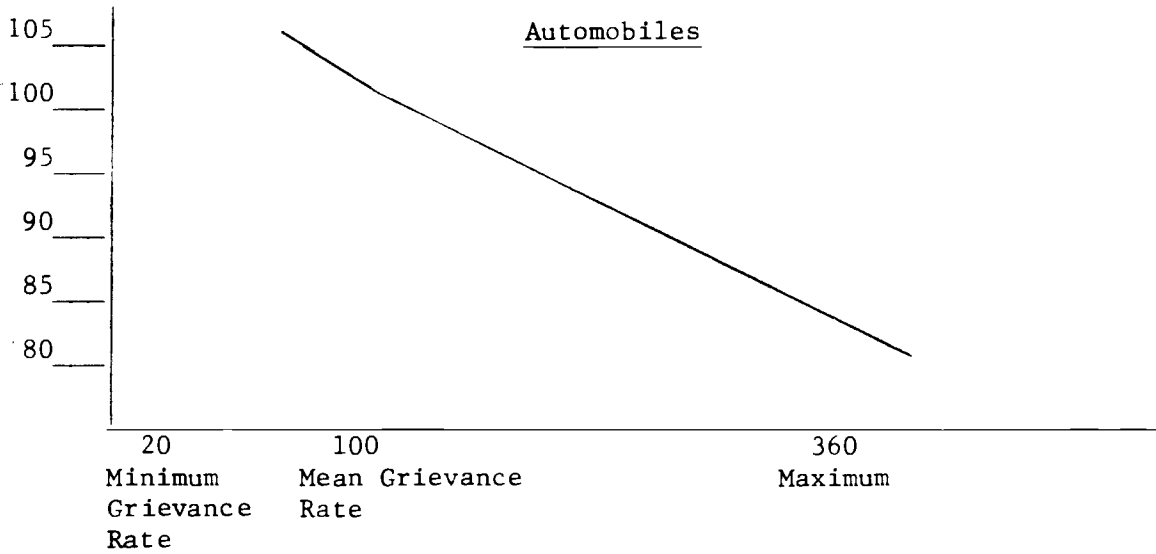
The effect of collective bargaining on productivity is not an immutable constant. In fact, the new literature on the union productivity effect indicates that the effect varies widely across settings. Is this variation systematic? In which climates will the positive effects of unionism flourish?

An important implication of the voice-response model is that productivity is likely to depend on the state of labor-management relations in shops. When those relations are poor, management is likely to have trouble getting high productivity. When they are good, workers and management may pull together for the benefit of the firm. Three studies have examined the link between productivity and the state of industrial relations at a plant and all three have found strong support for this proposition. In an analysis of productivity at 18 General Motors plants Professors Harry Katz and Thomas Kochan of M.I.T. and Kenneth R. Gobeille found higher productivity where plant managers rated the industrial relations climate good or where the rate of grievances filed by workers was low (indicated that workers viewed the state of labor-management relations as good). In a detailed study of paper mills, Bernard Ichniowski of the National Bureau of Economic Research obtained similar results: a plant with a low rate of grievances filed in a given period had notably better productivity than the same plant when it had a high rate of grievances filed (see Figure 2). In addition, he has estimated that low grievance plants have correspondingly higher profits, because of the better productivity, by as much as a third compared with high grievance plants. In the third study, Professor Michael Schuster of Syracuse University examined productivity at nine manufacturing plants over a period of five years, during which a cooperative union management program was introduced. He found an increase in productivity in six of the eight plants for which productivity could be measured.<sup>16</sup>

Figure 2

Grievance and Productivity at Organized Plants

Productivity, scaled  
so Average = 100



SOURCES: Automobiles, graph drawn with data found in Harry Katz, Thomas Kochan, and Kenneth Gobeille "Industrial Relations Performance, Economic Performance and the Effects of Quality of Working Life Effects: An Inter-Plant Analysis" (MIT, Sloan School Working Paper 1329-82, July 1982).

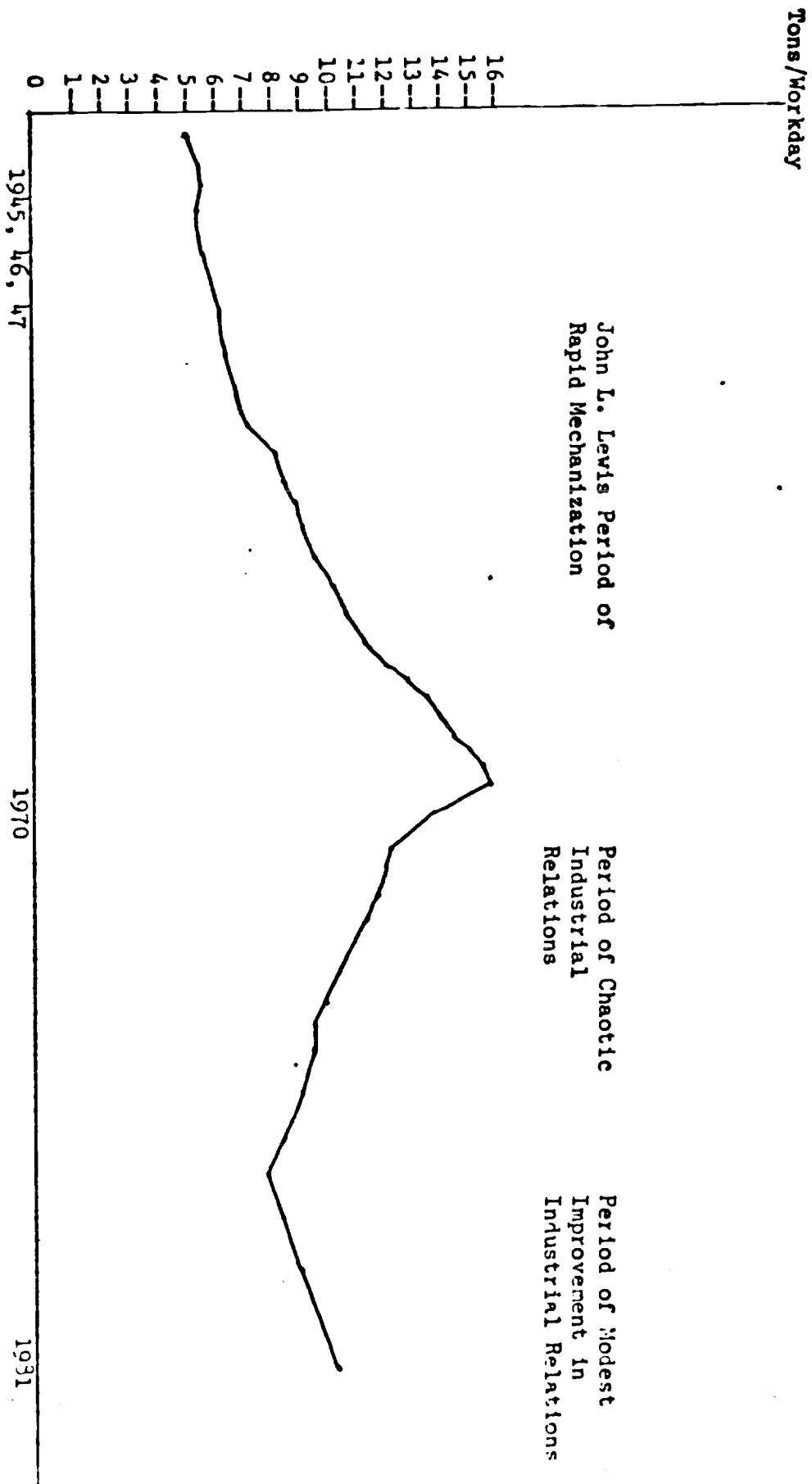
Paper mills graph drawn with data found in Bernard Ichniowski, "How Do Labor Relations Matter? A Study of Productivity in Eleven Paper Mills" (NBER, 1983), table 8-2 and from his computer printouts.



The striking change in the union effect in the coal industry from positive in the 1960s to negative in the 1970s shown in Figure 3 appears to be at least partially due to a deterioration in the state of industrial relations in the sector. In the 1950s, when John L. Lewis ran the United Mine Workers of America (UMW) the union was a strong, centralized organization (dictatorial, in many respects), whose policy was to favor mechanization, rapid technological change and rising wages at the expense of employment. The result, as can be seen in Figure 3, was extremely rapid productivity growth. After Lewis' death, however, the union was wracked with internal dissent, as one leader replaced another while workers engaged in wildcat strikes to voice their complaints about work conditions. One union president, Tony Boyle, was convicted of hiring gunmen to murder an insurgent leader. His successor, Arnold Miller, was widely criticized as ineffective, and the next leader, Sam Church, was turned out of office for failing to represent member's desires. Instability in underground coal mining reached such a state that in 1976 there were 1,383 work stoppages -- over ten times the number fifteen years earlier - - and 3.5 percent of total working time was lost due to wildcat strikes, over fifteen times as much as in 1961. Sensing the weakness of the union, some coal managements sought to take advantage of the situation, delaying settlement of grievances, and giving the union as much trouble as they could.<sup>17</sup> While other factors, such as the Mine Safety and Health Act of 1972, contributed to the reduction of productivity, the deterioration in industrial relations in the sector is, in our view and that of many industry participants, a major cause of the observed decline. Indeed, as the union began to stabilize in the 1980s, productivity began to rise once more. The

Industrial Relations and Productivity Growth in Underground Bituminous Coal

Figure 3



SOURCE: Productivity, data from Peter Navarro, "Union Bargaining Power in the Coal Industry, 1945-1981" Industrial and Labor Relations Review 36, 2 (January 1983):228.

lesson is that unionism per se is neither a plus nor a minus to productivity. What matters is how unions and management interact at the workplace.

### The External Climate

If industrial relations in coal could deteriorate to such an extent that unionized mines became markedly less productive than nonunion mines, what prevents conditions from deteriorating elsewhere in the organized part of the economy, with commensurate adverse effects on productivity? Why does coal in the 1970s appear to be the exception, rather than the rule?

We believe the answer lies with the extent of competition found in the product market for the output produced by unionized labor. Like everyone else, unions, management of organized plants, and covered workers are more likely to devote effort to productivity-augmenting activities when they face the gun of competition. Indeed, in a competitive sector, only the unions and management that are able to raise productivity to offset union wage gains will survive in the long run. Sectors which are sheltered from competition, by contrast, may or may not adopt productivity-improving activities. From this perspective the collapse of productivity in unionized coal is understandable. Coal is a natural resource that can be produced only in certain areas, so that the entry of competitors is limited. In the 1970s, the price of coal soared because of the shift in demand from oil to coal, allowing the organized mines to earn reasonable returns and stay in business despite their higher labor costs per unit of output. In 1975, when the estimated union productivity effect was very sizably negative, and when average productivity in underground mining was 40 percent lower than in the 1969 peak year, the rate of return on investment

in the entire industry was over four times what it had been in 1969. Of course, the unionized producers suffered a serious loss of market share, from about 70 percent of production in the late 1960s to 44 percent of production in 1980. But they still remained in business.<sup>18</sup>

It also appears that the union productivity effect appears to be greatest where product markets are most competitive, a pattern pointed out by Addison and Hirsch.<sup>19</sup> They noted that Clark in his study of the cement industry found the largest union effect in the Southwest where nonunion competition was greatest and that Mandelstamm's<sup>20</sup> case studies of the residential construction sector identified competition from contractors in Detroit as a key determinant of the high level of productivity in heavily unionized Ann Arbor.

#### Conclusion

What unions do to productivity is one of the key factors in assessing the overall economic impact of unions. The new quantitative studies indicate that productivity is generally higher in unionized establishments than in otherwise comparable establishments that are nonunion, but that the relationship is far from immutable and has notable exceptions. Higher productivity appears to run hand in hand with good industrial relations and to be spurred by competition in the product market, while lower productivity under unionism appears to exist under the opposite circumstances.

Footnotes

1. The quotation is from Derek C. Bok and John T. Dunlop, Labor and the American Community (New York: Simon and Schuster, 1970), p. 260.
2. See Richard B. Freeman and James L. Medoff, "The Two Faces of Unionism," Public Interest, Fall 1979, and What Do Unions Do? (New York: Basic Books, 1984).
3. We recognize that decreases in turnover which benefit a firm could reduce mobility in the economy to a point where they reduce national output. That unions substantially reduce turnover is documented in R.B. Freeman, "The Exit-Voice Trade Off in the Labor Market, Unionism, Job Tenure, Quits, and Separations," Quarterly Journal of Economics, XCIV, June 1980, pp. 643-673; evidence that this reduction in quits increases productivity is presented in C. Brown and J. Medoff, "Trade Unions in the Production Process," Journal of Political Economy, LXXXVI, June 1978, pp. 355-378.
4. Much of the relevant evidence is the basis for Sumner H. Slichter, James J. Healy, and E. Robert Livernash, The Impact of Collective Bargaining on Management (Washington, D.C.: The Brookings Institution, 1960).
5. See Allan B. Mandelstamm, "The Effects of Unions on Efficiency in the Residential Construction Industry: A Case Study." Industrial and Labor Relations Review, July 1965, pp. 503-521. See also Robert Cochran, "Productivity Among Union/Nonunion Construction Workers" (Harvard University, unpublished paper), 1979.

6. See R. B. Freeman and J. L. Medoff, What Do Unions Do? (New York: Basic Books, 1984), ch. 12.
7. Bok and Dunlop, op. cit., p. 261.
8. Investment to modernize plants was especially important in the recent giveback negotiations of the Steelworkers.
9. Nestor E. Terlecky, "Sources of Productivity Advance: A Pilot Study of Manufacturing Industries, 1899-1953," unpublished Ph.D. dissertation, Columbia University, 1960, found a negative correlation. John W. Kendrick and Elliot S. Grossman Productivity in the United States: Trends and Cycles (Baltimore, MD: Johns Hopkins University Press, 1980) find a positive relation between growth of productivity and growth of unionism. From their data, however, it is apparent that there is a positive correlation between the level of unionism and productivity growth as well as between the changes.
10. R. B. Freeman and J. L. Medoff, "Substitution Between Production Labor and Other Factors in Unionized and Nonunionized Manufacturer" Review of Economics and Statistics, Vol. LXIV, No. 2, May 1982, Table 4, p. 231, pp. 220-233.
11. Technically, if we have a general production function, the first order Taylor series expansion terms do not include the elasticity of substitution. It enters with the second order terms.
12. These quotations were given to us by Steven Allen. They are from, respectively, William Haber and Harold M. Levinson, Labor Relations and Productivity in the Building Trades (Ann Arbor, MI: University of Michigan, 1956); Allan B. Mandelstamm, "The Effects of Unions on Efficiency in the

Residential Construction Industry: A Case Study," Industrial and Labor Relations Review, Vol. 18, No. 4 (July 1965), pp. 503-521; Herbert R. Northrup and Howard G. Foster, Open Shop Construction (Philadelphia, PA: University of Pennsylvania Press, 1975); and Clinton C. Bourdon and Raymond E. Levitt, Union and Open-Shop Construction (Lexington, MA: D.C. Heath and Co., 1980).

13. For the Brown-Medoff estimate, see C. Brown and J. Medoff "Trade Unions in the Production Process," Journal of Political Economy, June 1978, pp. 355-378. For the Allen results, see S. Allen, "Unionization and Productivity in Office Building and School Construction," North Carolina State University, January 1983, p. 27-30.

14. Slichter, Healy and Livernash, p. 951.

15. The statement is from John T. Dunlop's lecture, "Labor-Management Response to Productivity Change," delivered April 1, 1982, published in "George S. Eccles, Distinguished Lecture Series, 1981-82" (Logan, UT: Utah State University, 1982), p. 34.

16. Harry Katz, Thomas Kochan, and Kenneth Gobeille, "Industrial Relations Performance, Economic Performance and the Effects of Quality of Working Life Effect: An Inter-Plant Analysis" (MIT, Sloan School Working Paper 1329-82 July 1982); Bernard Ichniowski, "How Do Labor Relations Matter? A Study of Productivity in Eleven Paper Mills" (processed, 1983); Michael Schuster, "The Impact of Union-Management Compensation on Productivity and Employment," Industrial and Labor Relations Review, Vol. 36, No. 3, April 1983, pp. 415-430.

17. For a history of coal see William H. Miernyck, "Coal," in Gerald G. Somers, Ed., Collective Bargaining: Contemporary American Experience (Madison, WI: Industrial Relations Research Association, 1980), especially pp. 17-23. The quotation concerning Lewis' views of technological change is from p. 26. Further explanation of Lewis' views may be found in U.S. News and World Report, November 9, 1959, pp. 60-64. The data on work stoppages are from the Bureau of Labor Statistics, "Collective Bargaining in the Bituminous Coal Industry."
18. See Peter A. Navarro, "Union Bargaining Power in the Coal Industry, 1945-1981," Industrial and Labor Relations Review, January 1983, Vol. 36, No. 2, pp. 214-229.
19. John T. Addison and Barry T. Hirsch, "Do Unions Really Raise Productivity? Alternative Views and Evidence," mimeographed, June 1983.
20. Allan B. Mandelstamm "The Effect of Unions on Efficiency in the Residential Construction Industry: A Case Study," Industrial and Labor Relations Review, July 1965, 18(3), p. 503-21.