

The Impact of Safety and Health Legislation on 'Union Effectiveness'

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UNION SUPPORT FOR SAFETY AND HEALTH LEGISLATION

Organized labor has vigorously supported legislation establishing occupational safety and health (S&H) standards. In addition, unions have lobbied for capital-specific engineering controls over labor-specific personal protection controls. Because some have noted that safety and health legislation may result in fewer jobs or reduced compensation, while others have suggested that government regulation contributes to diminished union membership, researchers have been examining why unions have supported S&H standards.¹

Studies of support for S&H regulation have focused on rent seeking or problems in collective bargaining. If engineering standards increase the cost of capital relative to labor, then employment may rise. If unionized firms provide more safety and health than nonunion firms, or if unionized firms have a comparative advantage in compliance with regulations, then the imposition of S&H standards industry-wide may allow unionized employers and workers to preserve or obtain rents.² Because the collective bargaining process does not always result in agreements on the provision of safety and health, unions may turn to regulation instead. Unions could then use the provisions of S&H legislation to threaten employers with government safety inspections, audits, and fines.³

Those analyses focusing on union rent seeking or on problems in bargaining over safety and health provisions assumed that the collective bargaining process had been established. Yet observations by Berman [1978, 118] and Northrup et al. [1978, 194-95, 445] indicate that S&H legislation has received organized labor's support in substantially nonunionized industries. For example, in textiles, which has been difficult for unions to organize (see Rowan and Barr [1987, 75-91, 101-02]), there has been strong union support for S&H standards. If unions have been unable to organize a group of employers, then why would they advocate S&H regulation? Can such regulation affect the ability of unions to organize?⁴

Carter, Hueth, Mamer, and Schmitz [1987, CHMS hereafter] noted that unions may not remove enough output, by striking, to inflict losses on producers. Indeed, during strikes some producers remain in operation or sell stockpiled output. Consequently, as also observed by Cooke [1985], unions have not always been able to obtain collective bargaining agreements.

CHMS and Rees [1989, 33] each argued that in an effective strike producers experience losses. CHMS defined a minimum effective union (MEU) as one that can remove enough output to lower producers' profit. For the case of agriculture, they showed that an MEU must remove a "substantial percentage" of output. This new research on minimum union effectiveness provides an additional explanation for organized labor's support of S&H legislation: safety and health standards change the condition for a minimum effective union and can help to establish and promote collective bargaining.

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This study shows how S&H legislation changes the ability of unions to obtain collective bargaining agreements. Specifically, it demonstrates how regulation alters the necessary condition for a minimum effective union. Using a framework similar to CHMS, the analysis shows how some cost changes make it easier (more difficult) for a union to be effective. Further, regulation may enhance union effectiveness while also increasing employment. Organized labor's preference for engineering controls appears to be consistent with the types of changes benefiting unions. The analysis therefore amends previous research: not only may ongoing collective bargaining lead unions to support S&H legislation, but unions may seek such legislation to be more effective in establishing collective bargaining.

THE IMPACT OF S&H LEGISLATION ON THE MINIMUM EFFECTIVE UNION

Industry Equilibrium and the Minimum Effective Union

The analysis begins by reviewing briefly the minimum effective union concept. Suppose a union tries to bargain with a group of employers. Unions have typically used strikes to force firms to bargain. However, CHMS, Maloney et al. [1979], and Thompson [1980] each noted that a strike may actually increase producer profit, by reducing production and forcing up the price of the remaining output, thereby creating cartel-type profit. CHMS argued that an effective union must withdraw enough output to reduce producers' profit. For an industry of price-taking producers, they obtained the minimum quantity of output the union must withdraw by solving for the post-strike output at which industry profit just equals the pre-strike profit.

Consider an industry with a number of producers and let Q denote their collective output. Following the framework used by CHMS, suppose producers' total cost, C , follows

$$(1) C = aQ + \frac{1}{2}bQ^2 + F, \text{ where } a, b, \text{ and } F > 0,$$

and the price of output, P , follows

$$(2) P = \alpha - \beta Q, \text{ where } \alpha, \beta > 0 \text{ and } \alpha > a.$$

If total production is altered, the price of output changes: $dP/dQ = -\beta < 0$. Suppose the firms have a degree of market power m , where $0 \leq m < 1$, so that they behave as if $dP/dQ = -m\beta$. If $m = 0$, producers are perfectly competitive, taking output price as given: firms behave as if $dP/dQ = 0$ when in reality $dP/dQ = -\beta$. Although each producer acts to maximize its own profit, the firms' joint-profit is not maximized because the price-taking producers behave as if $dP/dQ = 0$. If $0 < m < 1$, firms have some market power, but they do not take into account fully the effects of their production decisions on price. If m approaches 1, production approaches the joint-profit maximizing

output quantity. (If $m = 1$, there would be a cartel; firms would produce the quantity of output maximizing their joint-profit. Obviously, any output removal would reduce the joint-profit.)

The total quantity of output produced, Q^c , satisfies

$$(3) Q^c = (\alpha - a)/[b + (1 + m)\beta]$$

and the joint-profit at this output, π^c , is

$$(4) \pi^c = (\alpha - a)^2(b + 2m\beta)/2[b + (1 + m)\beta]^2 - F, \text{ where } \pi^c \geq 0.$$

To find the breakeven quantity of output, denoted here by Q^{MEU} , set producers' profit equal to equation (4) and use the quadratic formula to find

$$(5) Q^{MEU} = (\alpha - a)(b + 2m\beta)/[b + (1 + m)\beta](b + 2\beta).$$

To be effective the union must be able to reach Q^{MEU} . The union does not actually have to strike, it only needs to make a credible threat to drive production below Q^{MEU} . In examining the expression for Q^{MEU} notice that

$$(6) Q^{MEU} = (1 - \theta)Q^c, \text{ where } 1 > \theta \equiv 2\beta(1 - m)/(b + 2\beta) > 0.$$

Q^{MEU} is simply a fraction of Q^c , where θ is the proportion of output the union must be able to remove.

The Impact of S&H Legislation

If S&H legislation affects firms' cost, then production, Q^c , the breakeven output quantity, Q^{MEU} , and the proportion of output the union must be able to remove, θ , may change. Northrup et al. (p. 143) discussed how advocates of S&H legislation argued that supplying safety and health to workers should be a "regular cost" of production. The observations of English [1978], Mendeloff [1979, 21, 74-75, 155], and Northrup et al. (pp. 212-13) indicate that organized labor recognized that S&H legislation could affect producers' cost, but nevertheless supported such legislation.

Suppose a change in S&H standards leads to a parallel shift in the producers' marginal cost curve. Differentiation of equations (3) and (5), respectively, yields:

$$(7.1) \partial Q^c / \partial a = -1/[b + (1 + m)\beta] < 0 \text{ and}$$

$$(7.2) \partial Q^{MEU} / \partial a = (1 - \theta)(\partial Q^c / \partial a) < 0.$$

An upward shift in marginal cost reduces production while keeping unchanged the proportion of output to be removed. Hence the fall in production implies a smaller breakeven level of output. Further, the quantity of output the union must be able to withdraw, θQ^c , is reduced.

If the union must use more resources and effort to (be able to) remove a greater quantity of output, then an upward shift in marginal cost reduces the union's cost of being effective, making it easier to force bargaining to develop.⁵ But with less costly effectiveness comes a reduction in output. If employment is positively related to production, then there will be less employment. In fact, it is because Q^c falls by more than does Q^{MEU} that there is a reduction in the quantity of output to be withdrawn.

Suppose S&H legislation affects the slope of producers' marginal cost curve. Differentiation of equations (3) and (5), respectively, yields:

$$(8.1) \partial Q^c / \partial b = -(\alpha - a)/[b + (1 + m)\beta]^2 < 0 \text{ and}$$

$$(8.2) \partial Q^{MEU} / \partial b = (1 - \theta)(\partial Q^c / \partial b) + [\partial(1 - \theta) / \partial b]Q^c.$$

An increase in b not only reduces production but also the proportion of output to be removed. Hence the impact on Q^{MEU} is ambiguous. Whether or not Q^{MEU} rises or falls, there is a fall in the quantity of output the union must be able to withdraw:

$$(9) \partial(\theta Q^c) / \partial b = -2(\alpha - a)(1 - m)\beta\{2b + (3 + m)\beta\} / \{[b + (1 + m)\beta](b + 2\beta)\}^2 < 0.$$

Although a steeper marginal cost reduces the union's cost of being effective, there is a reduction in organizable employment.

The results above suggest that in supporting stricter regulation a union must weigh the benefit of a lower cost of being effective against the cost of less employment. Instead of a change only in a or only in b , suppose both parameters are affected. Then the union need not necessarily trade off less costly effectiveness against less employment.

Suppose S&H legislation shifts the marginal cost curve down while also steepening it. Total differentiation of equation (3) yields:

$$(10) dQ^c = \{-1/[b + (1 + m)\beta]\}da - \{(\alpha - a)/[b + (1 + m)\beta]^2\}db.$$

Suppose a falls and b rises to keep industry output unchanged. Setting $dQ^c = 0$, it can be seen that

$$(11) da/db = -(\alpha - a)/[b + (1 + m)\beta] = -Q^c < 0.$$

Although the cost changes combine to keep production unchanged, the breakeven level of output rises. From equation (6) it can be seen that $(1 - \theta)$ rises, so Q^{MEU} is greater. Consequently, there is a reduction in the amount of output the union must be able to remove. Not only is it easier to compel bargaining to occur, but there will be no sacrifice in output. The intuition behind this result is straightforward. Let Q^m denote the quantity of output that maximizes industry profit. This monopoly output quantity, satisfying $Q^m = (\alpha - a)/(2\beta + b)$, is increased by the changes in a and b . Because the difference between Q^c and the monopoly output is reduced, the resulting difference between Q^c and Q^{MEU} is smaller.

Now suppose a falls and b rises to keep unchanged the amount of output the union must be able to withdraw. Total differentiation of equation (3) yields:

$$(12) d(Q^c) = \{-2\beta(1 - m)/[b + (1 + m)\beta](b + 2\beta)\} da - \{2\beta(1 - m)(\alpha - a)[2b + (3 + m)\beta]/\{[b + (1 + m)\beta](b + 2\beta)\}^2\} db.$$

Setting $d(\theta Q^c) = 0$, it can be seen that

$$(13) da/db = -\{[2b + (3 + m)\beta]/(b + 2\beta)\} Q^c < -Q^c < 0.$$

The steeper marginal cost curve reduces the proportion of output to be removed. Thus Q^c must rise to keep θQ^c unchanged. The cost changes increase output and employment without affecting the union's cost of being effective.⁶

For a fall in a and rise in b there is a range of values for da/db such that (1) it is easier for the union to be effective and (2) there is an increase in production. Specifically, if $-Q^c > da/db > -\{[2b + (3 + m)\beta]/(b + 2\beta)\} Q^c$, then it is less costly for a union to be effective and there will be greater employment.⁷

UNION SUPPORT FOR PARTICULAR SAFETY STANDARDS

The above analysis provides additional insights into organized labor's support for particular types of safety standards. Unions can be expected to advocate standards lowering the cost of being effective without reducing production. If standards reduce the cost of being effective (increase output) but decrease output (increase the cost of being effective), then unions must balance the benefit against the cost.

The cost effects of stricter personal and engineering safety standards have been modeled by Fuess and Loewenstein [1990].⁸ If the cost of personal protection measures varies directly with employment, then stricter personal protection standards increase the marginal cost of labor and can thus shift up producers' marginal cost curve. If the cost of engineering safety controls varies less than proportionately with the size of the workplace or workforce, then stricter engineering standards reduce the marginal cost of labor and can shift down producers' marginal cost curve. If increased safety and health efforts hamper production by requiring specific safety procedures or equipment, then marginal productivity may be affected, thereby altering marginal cost's slope.⁹

It is now possible to understand better organized labor's support for engineering controls over personal protection equipment. Besides potentially increasing the demand for union labor or allowing unionized firms and workers to preserve or obtain rents, engineering controls can also enhance the ability of unions to force bargaining to take place. If engineering controls alter producers' marginal cost to reduce the unions' cost of being effective without reducing production, then unions can be expected to support such controls. If engineering controls only shift marginal cost down, then unions must balance greater employment against a higher cost of being effective. To the extent personal protection standards shift marginal cost up, increase its slope, or both, unions must balance the reduced cost of effectiveness against less employment.

Grout [1984; 1985] argued that unions have greater bargaining leverage when firms are committed to investments in capital. This study supplements Grout's analysis. By requiring firms to commit to engineering controls, S&H standards may help to establish unions' bargaining leverage.

CONCLUSION

This study has analyzed how safety and health (S&H) legislation alters the effectiveness of a union in precipitating collective bargaining. As argued by Carter, Hueth, Mamer, and Schmitz [1987], to pressure a group of producers to bargain, a union must be able to reduce their joint-profit. If S&H standards alter producers' cost, then industry equilibrium, the necessary condition for an effective union, and the quantity of output a union must be able to remove will be affected.

A union benefits from a downward shift in the producers' marginal cost curve accompanied by an appropriate increase in the curve's slope. The cost to the union of forcing bargaining is reduced and employment rises. Other cost changes require the union either to choose between less costly effectiveness and less employment, or less of both.

The results of this study provide some interesting twists on the relationship between unions and government regulation. Some have claimed that unions support S&H laws as a substitute for bargaining over safety and health. In addition, Bacow [1980, 90] wrote that S&H legislation weakens union efforts to obtain other demands. More generally, Bennett [1989, 87-88] and Neumann and Rissman [1984] argued that government provided benefits erode the support for unions. Not only may bargaining over safety and health lead unions to support S&H regulation, but this paper shows that such regulation can help to strengthen union effectiveness in achieving collective bargaining. This is consistent with the observations of Mendeloff (p. 155), Northrup et al. (pp. 138, 257), Soutar [1978], and Teplow [1972] that unions have used the provisions of S&H legislation to increase their bargaining power, even on issues other than safety and health.

Gersuny [1981, 114] observed "reciprocal influences" among laws affecting labor. He wrote that changes in labor law promoted collective bargaining, which led to union support for S&H and workmen's compensation laws. But unions have not always won labor law changes making it easier to organize (see for example Freeman and Medoff [1984, 191-206] and Hirsch and Addison [1986, 277-84]). This study reveals another channel of legislative influences, showing how S&H regulation can help to promote collective bargaining. This may explain in part why organized labor renewed its support for S&H legislation after it failed to obtain changes in labor law (see Kelman [1980, 258]).

The analysis also suggests a relationship between unions and the scope of government regulation. Bacow (pp. 57-58, 103-21) and Spulber [1989, 398] remarked that unions scrutinize employers' provision of safety and health. They thus argued that organized labor could help to "enforce" S&H laws, which would serve to "decentralize" regulation. This study generates a contrasting prediction: S&H legislation can support union effectiveness and lead organized labor to favor centralized regulation by government.

In closing, Ashford [1976, 379, 495], Berman (p. 155), and Northrup et al. (p. 445) each observed that unions have used safety and health as an organizing issue. If S&H legislation lowers the cost to organized labor of being effective, then unions trying to obtain recognition in relatively union-free industries can be expected to benefit. This helps to explain strong union support for S&H standards in the textile industry. Indeed, the Amalgamated Clothing and Textile Workers Union acknowledged (see for example its Report of the General Executive Board [1978, 82]) that the union has successfully used the provisions of S&H legislation in its organization drives.

NOTES

1. On the potential effects of safety and health (S&H) legislation on employment and compensation, as well as union support for engineering controls, see the analyses of Fuess and Loewenstein [1990], Mendeloff [1979, 32-33, 43-46, 75, 162-64], Miller [1984], Nichols and Zeckhauser [1977], and Viscusi [1983, 53-58]. On the impact of government provided benefits on union membership, see the analysis of Neumann and Rissman [1984].
2. See Miller or Mendeloff (p. 75) on the impact of engineering standards on the cost of capital relative to labor. Analyses of the impact of S&H legislation on the distribution of rents in an industry include Bartel and Thomas [1985; 1987], Fuess and Loewenstein [1990], Hughes et al. [1986], Maloney and McCormick [1982], and Neumann and Nelson [1982].
3. Those discussing union support for legislation as an alternative to bargaining over safety and health or as a device for threatening employers include Ashford [1976, 199-200, 492-95], Bacow [1980, 17, 65, 90, 96-97], Kochan et al. [1977, 1-2, 85], Mendeloff (pp. 16-17, 29, 118, 155), Northrup et al. [1978, 135-37, 204-06, 256-57], Perty et al. [1982, 32-34],

Smith [1986], Teplow [1972], and Weil [1988]. Smith found that government inspections prompted by worker complaints occurred more at union than nonunion workplaces, but he did not find such inspections related to the length of strikes.

4. Unions may advocate social legislation "in the general interest" or in exchange for others' support for union causes. For reviews of organized labor's support for social legislation, see Freeman and Medoff [1984, 191-206], Hirsch and Addison [1986, 268-69, 273-84], and Masters and Delaney [1987]. Investigation of these broader issues is beyond the scope of this study.
5. This study focuses only on the necessary condition for a minimum effective union. Analysis of the many bargaining arrangements and outcomes between a union and a group of producers is beyond the scope of the paper.
6. Suppose a rises and b falls to keep Q^c unchanged. There is a rise in both the proportion and quantity of output to be removed. If the parameters adjust to keep θQ^e unchanged, then production falls.
7. Fuess [1990] considered the case in which a union seeks to organize an industry containing two distinct groups of producers. He demonstrated that different strike strategies—an industry-wide strike versus a series of selective strikes—alter the condition for a minimum effective union. A selective strike may impose a loss on the struck group while allowing the nonstruck group to benefit. If there is mutual strike aid, i.e., the nonstruck employers replace the struck group's loss, then each selective strike must remove enough output to reduce the industry's profit. As a result, it is easier for a union to organize the industry by launching a general strike than a series of selective strikes. If there is no strike aid, then each selective strike needs only to remove enough output to reduce the targeted group's profit and it is easier for a union to organize the industry by conducting a series of selective strikes. Although the analysis here could be extended to consider several groups of employers, the main findings of this study would not change. If there is (no) mutual strike aid, the union is expected to follow a (selective) general strike strategy. In either case, an increase in a or in b would make it easier for the union to be effective and there would be a range for da/db (reduction in a, increase in b) such that it was easier for the union to be effective without a reduction in production.
8. Fuess and Loewenstein [1990] assumed that production follows constant returns to scale, the cost of personal protection measures varies directly with employment, the cost of engineering safety controls varies less than proportionately with the size of the workplace, and government issues penalties for noncompliance with personal and engineering safety standards. They only considered the expected costs of providing job safety and did not specify how safety affected a firm's production function. Their analysis can be extended in obvious ways to incorporate the expected costs of supplying occupational health or to include assumptions about the impact of safety and health on a firm's production function.
9. Northrup et al. (pp. 475-77) observed that in the textile industry new, redesigned machines might have complied with S&H noise standards and increased productivity. But immediate compliance with the noise standards required existing machines to be refitted and adjusted, which did not increase production.

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