

Government comes to the workplace: an assessment of OSHA

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CONGRESS passed the Occupational Safety and Health Act (OSHAct) of 1970 in order "to assure so far as possible every working man and woman in the nation safe and healthful working conditions." Performance has fallen far short of ambition. Indeed, OSHA (Occupational Safety and Health Administration), the agency created by executive order to enforce the OSHAct, has become a prominent symbol of misguided Federal regulation. It accomplishes little for occupational safety and health, yet imposes significant economic costs. As we shall argue, OSHA's failings to date should not be surprising since it focused on the wrong problem, safety on the job instead of occupational health, and then employed the wrong tool, direct regulation rather than an incentive approach.¹

The problem the OSHAct confronted was significant. Each year, according to National Safety Council estimates made in 1970, more than 14,000 workers died on the job, and another 2.2 million suffered disabling injuries. Data on occupational illnesses were far

¹ For extensive references, supporting data, and recommendations concerning specific aspects of the performance of OSHA, see Richard Zeckhauser and Albert Nichols, "The Occupational Safety and Health Administration: An Overview," in *The Study on Federal Regulation of the Senate Committee on Governmental Affairs*, Vol. 6 (95th Congress, First Session).

less reliable, since official statistics recorded only a small fraction of actual cases, but potentially much more disturbing. Extrapolation from one study cited in Congressional reports suggested that 390,000 cases of occupational illness were incurred each year, resulting in as many as 100,000 fatalities annually.

Supporters of the OSHAct stressed not only the toll, but also what the House Committee on Education and Labor called the "on-the-job health and safety crisis." Injury rates had reversed their long-term downward trend and had been rising since the mid-1950's. From 1960 to 1970, for example, the rate of accidents in manufacturing rose 26.7 percent, an increase explained only in part by cyclical economic factors and the changing composition of the labor force. Identifying this problem as a crisis, however, created the impression that swift action was essential and would yield major improvements. It has not; the crisis was exaggerated from the start. (In the same decade, the number of workdays lost to injuries and accidental deaths held steady in manufacturing, and the death rate from accidents continued to decline.) Moreover, the hastily adopted methods of the OSHAct failed to confront, or indeed recognize, the underlying economic forces that generate workplace losses.

Prior to passage of the OSHAct, Federal health and safety rules covered a limited number of workers, including Federal employees, miners, longshoremens, and workers employed under certain Federal contracts. Each of the states also regulated occupational safety and health, but state laws varied widely in their stringency and coverage, and many were enforced only weakly. Annual expenditures ranged from \$2.70 per worker in some states to less than \$.01 in others. Enthusiasts of regulation, using the measure of statutes and number of inspectors, found the situation among the states highly unsatisfactory. But there was no evidence that workers in states with tighter standards or higher expenditures enjoyed safer or healthier working conditions.

In addition to regulatory efforts, all of the states had workmen's compensation laws to provide for medical expenses and for partial replacement of lost wages due to occupational injuries and illnesses. In 1970, the year that the OSHAct was passed, workmen's compensation cost employers \$4.9 billion. Many critics charged, however, that most state laws were deeply flawed. This allegation was supported by the findings of the National Commission on State Workmen's Compensation Laws, a temporary body created by the OSHAct itself. The Commission noted in 1972 that only 22 of the

50 states met even half of the criteria suggested by the Labor Department. Its recommendations included the extension of coverage to all workers, increased benefit levels, removal of dollar and time limits on compensation, and fuller coverage of occupational diseases.

Few Congressmen appear to have questioned the need for Federal intervention in the area of occupational safety and health. At the time, there was marked Congressional enthusiasm for Federal protective regulation. (In a brief period around 1970, Congress also passed regulatory legislation on coal-mine health and safety, air pollution, consumer-product safety, and automobile safety.) Most Congressmen, and even the unenthusiastic Nixon Administration, accepted uncritically the idea that intervention should take the form of direct regulation of hazardous working conditions. Controversy centered instead on secondary issues, primarily where to lodge the authority for setting standards. The Administration favored an independent commission, but organized labor and Congressional Democrats ultimately prevailed in putting the Secretary of Labor in charge. The unions, smarting under charges that they were too willing to tolerate health and safety hazards in exchange for higher wages, pushed hard for a tough bill that would defuse the pressure on them to take a harder negotiating line.

OSHA is responsible, either directly or through its supervision of state programs, for the health and safety of about 60 million workers employed in roughly five million workplaces.² OSHA's primary activity has been the promulgation and enforcement, through on-site inspections, of several thousand standards covering the physical conditions of workplaces. Most of these specify, often in great detail, the required physical characteristics of plants and equipment. The standards now overwhelmingly concern safety rather than health problems, although efforts are being made to redress this imbalance.

Since its creation in 1971, OSHA has grown steadily; it is now second in size only to the Environmental Protection Agency among Federal regulatory agencies. It has authorization to staff over 2,700

² Fewer than half the states have secured Labor Department approval to run their own safety and health programs. The primary requirements for such approval, which carries with it 50-percent Federal funding, are that the standards be "at least as effective" as OSHA's and that adequate funding and staffing be provided for their enforcement. The future of state participation is uncertain. Initially all but five of the states sought permission to run their own plans, but tight budgets and organized labor's bitter opposition to state-run programs led many to withdraw—including some that had already secured approval, most notably New York.

positions. Its impact on the American economy is far greater than its fiscal 1977 budget of \$130 million might suggest, since its own expenditures are small compared to what it requires private firms to spend.

Despite the optimism with which the agency was launched, few are happy with OSHA's performance. Both politically and practically it has been a failure. It has generated fierce antagonism in the business community and is viewed by many as the quintessential government intrusion. And it has had virtually no noticeable impact on work-related injuries and illnesses.

In fact, most of OSHA's failings were predictable. However, they were not foreseen because 1) no attempt was made to analyze the problem of occupational safety and health in terms of likely causes and cures; 2) economic costs, a major consequence of any regulatory effort, were systematically excluded from deliberations; and 3) serious consideration was not given to any approach other than direct regulation. At the outset, Congress and those who pushed for OSHA, principally the unions and activists such as Ralph Nader, should have asked some fundamental questions: Was government intervention necessary, and if so, what form should it take? Who should determine levels of occupational safety and health? What levels are appropriate? What actually determines levels of occupational safety and health? Politically oriented groups like those that brought OSHA into being are unlikely to ask such questions. But the failure to raise them has already proved costly with OSHA. It is likely to prove many times more wasteful as the agency intensifies its efforts in the area of occupational health, a much more complex and consequential undertaking than safety regulation.

The labor market

Levels of safety and health in the workplace are determined by the decisions and actions of both workers and employers. To understand how, it is useful first to consider the hypothetical world of perfectly competitive labor markets. Accidents and illnesses impose economic costs on workers (lost wages and the expenses of medical care) as well as nonpecuniary costs such as pain and suffering, anxiety, and the tragedy of premature death. To attract workers to employment exposing them to risks, employers must pay premiums above ordinary compensation for otherwise equivalent work. Wage premiums for hazardous work are then the driving force that determines levels of health and safety in competitive

markets. In addition to compensating workers for accepting risks, such premiums provide incentives for firms to improve health and safety levels as a means of reducing their wage costs. The outcome is efficient: The firm minimizes the sum of the costs of preventing accidents and illnesses and the cost of wage premiums for hazardous work, as would the workers if they owned the firm.

Although economic theory has long recognized the role of wage premiums for hazardous work in determining levels of health and safety, empirical studies have appeared only recently. The most widely cited study estimated that to accept an additional one-in-1,000 risk of death, workers require an extra \$136 to \$260 per year. A complementary investigation showed that workers who rate their jobs as dangerous or unhealthy receive about \$375 extra per year.³ Studies such as these suggest that workers are at least partially aware of the risks they run, and that, as economic theory predicts, market forces do lead to higher wages for workers in risky professions. They do not tell us how accurately workers assess risks—particularly the risks associated with particular jobs, as opposed to occupations or industries—nor do they tell us whether the premiums received are at the appropriate level.

But several factors prevent the labor market from fully achieving efficient outcomes, and thus provide possible arguments for government intervention. There are two classes of labor-market imperfections: imperfect information and externalities.

1. *Imperfect information:* The model of the perfectly competitive market assumes that workers and employers possess the information needed to make decisions about levels of occupational safety and health. That is, they know what the risks are and the costs of technologies for reducing them. For this to be true, the information must be available, it must be transmitted to the affected parties, and individual workers and firms must be able to understand it.

³The first study, "The Value of Saving a Life: Evidence from the Labor Market," by Richard Thaler and Sherwin Rosen, in Nester E. Terleckyj (ed.), *Studies in Income and Wealth*, Vol. 40 (New York, National Bureau of Economic Research), may well underestimate wage premiums, since it covered only high-risk occupations. W. Kip Viscusi examined the role of worker perception of risks as part of his Ph.D. dissertation at Harvard, *Employment Hazards: An Investigation of Market Performance* (1976). Other studies include one by Robert Smith, *The Occupational Safety and Health Act* (Washington, D.C., American Enterprise Institute, 1976), which yielded estimated wage premiums almost 10 times greater than Thaler and Rosen's. In contrast, James Chelius, "The Control of Industrial Accidents: Economic Theory and Empirical Evidence," *Law and Contemporary Problems*, 38 (1974), pp. 700-729, was unable to find any premiums for risk.

Problems arise at each of these three stages. First, the data relating occupational conditions to health and safety outcomes are poor. No individual or firm has sufficient incentives to tabulate such data or to conduct research on ways to reduce hazards, for the individual or firm would bear all of the cost yet reap only a small portion of the benefits. Without government participation, too little information will be generated on the causes of workplace losses and the means to prevent them.

Even if relevant information were provided, however, workers and firms might find it hard to make informed decisions. Experimental and empirical evidence suggests that individuals have considerable difficulty processing information about small probabilities, which are a critical characteristic of most occupational safety and health risks. Thus it may be valid to argue that the government should make certain decisions for workers and firms that they could correctly make for themselves only if they devoted considerable time and effort to acquiring and understanding information.

Health risks may be considerably more difficult for an individual to estimate than the risks of an accident, since health losses may not show up for many years. Moreover, it may be impossible then to establish that employment caused the health loss if the illness could have had other causes. For example, even the most observant workers would probably fail to notice that working with substance X raises by one percentage point the risk of lung cancer 20 years later. Thus inadequate information is a stronger argument for government intervention in health than in safety.

2. *Externalities*: If the competitive market is to work efficiently, only the worker and his employer should be affected by the level of safety and health provided him. If the welfare of others is involved, then externalities exist, and unhindered market processes will not result in efficient outcomes.

The primary externality in the case of workplace safety and health is financial, arising out of current institutional arrangements. Society cares for and compensates individuals who are sick or injured, including those who suffer an occupational illness or disability. Life-insurance benefits, health-care costs, and the expense of supporting a family whose wage earner is ill or deceased are borne only in small part by the workers whose health is impaired, or by his employer. Government-provided insurance, including Social Security and welfare payments, is not experience-rated. That is, employers who impose higher costs on the insurance fund by permitting unhealthy working conditions are charged nothing

extra for their negligence, nor are workers who take risky jobs. Moreover, our whole medical-care system is laced with governmental subsidies. When a worker gets sick, the rest of society, directly or indirectly, foots a substantial portion of the bill through taxes. Even private insurance schemes, such as an employer's health-benefits program, are far from fully experience-rated. If some form of comprehensive health-care coverage were enacted under a national health insurance plan, these financial externalities would become both more direct and substantially larger in scope.

Workmen's compensation was originally viewed in part as a way of giving employers incentives to provide greater safety. In fact, however, only the largest firms are fully experience-rated (or, equivalently, self-insured). For small and medium-sized firms, most of the cost of workmen's compensation is unrelated to the firm's own safety record. Few cases of illness result in any payment of workmen's compensation.

Given these financial externalities, individual workers and firms do not bear the full cost of accidents and illnesses, and hence settle on inefficiently low levels of occupational safety and health. Governmental intervention to promote occupational safety and health thus can be viewed as an attempt to correct the distorted incentives created by income-transfer policies and by government and private health-and-disability insurance plans.⁴

The mere identification of an externality, however, does not provide a sufficient basis for supporting government intervention. We must measure the magnitude of the externality and intervene only when it is great relative to the expected costs of regulation. Within the area of occupational safety and health, the externalities, measured either in absolute terms or relative to the costs borne by the worker and his employer, seem far greater in most cases for health than for safety. Workmen's compensation imposes much of the cost of accidents on the employer, but there is no equivalent charge for the long-term health losses his working conditions may generate. We should also distinguish the magnitude of externalities among health losses. For example, the primary effect of noise exposure is impaired hearing, the "cost" of which is borne almost entirely by the affected worker. The asbestos worker, who runs a high risk

⁴Note here the phenomenon of pyramiding intervention. The government starts by subsidizing the costs of ill health or injury. This subsidy then reduces individuals' incentives to provide sufficiently for their own health. But society as a whole, through its subsidy schemes, has secured a financial interest in maintaining their health. This suggests that the government must intervene once again, to assure that freely accepted health risks are not excessive.

of cancer, presents quite a different problem. Society loses from having both to support his medical treatment and possibly to care for his family after he is dead or no longer able to work. Note also that the problem of inadequate information would provide stronger support for intervention in the case of asbestos than in the case of noise. The presence of noise is obvious, and its link to hearing loss is easy to comprehend. In contrast, substances such as asbestos are carcinogenic at levels too low to detect with the unaided senses, and the ultimate link to health loss is usually too obscure for an individual worker to notice.

Equity

Two observations introduce equity considerations into the discussion of appropriate levels for safety and health: 1) Safety and health threats to workers vary significantly from industry to industry and occupation to occupation; and 2) those exposed to the highest risks are disproportionately the poor, the unskilled, and members of disadvantaged minority groups. There is little disagreement concerning these facts. Moreover, economic theory would predict that the unhindered market would tend to generate such outcomes. Poor people, on average, will be willing to accept risky work for lower compensation than higher-income individuals would demand.

It is on matters of interpretation and inference for policy that the sharpest disagreements arise. The proponents of social programs for occupational safety and health start, for the most part, with the belief that all American workers have what Representative Phillip Burton called the "inalienable right to earn their living free from the ravages of job-caused death, disease, and injury." The notion is that bodily integrity is not a commodity appropriate for trade on the market, any more than one's vote or freedom is.

Those who believe that occupational safety and health levels should be determined through market processes, modified by regulation to the extent that the conditions assumed by the competitive market model do not hold, argue in response that individuals assuming risks receive wage premiums for accepting those risks. The worker chooses his level of safety for himself. If the government prohibits certain classes of risky activities, it may well be diminishing the economic prospect of the very people it wishes to help, the most disadvantaged members of society.

Why has this argument failed to convince those who view safe

and healthful workplaces as a right? First, there is the special nature of health, which is a nonmarket good provided, at least initially, by nature. Second, an undercurrent of paternalistic obligation runs through their thinking: Some people, the poor in particular, supposedly will not know enough to choose safe and healthful employment. Third, the correlation between occupational risk and the distribution of income causes discomfort to some proponents of government intervention: Losses of life, limb, and workdays draw attention to inequalities in our society that would otherwise be fuzzier in our consciousness. The legislative history of the OSHAct shows quite clearly that equity arguments, with their emotional overtones, were politically effective in securing Federal intervention. The implications of these arguments, however, were never spelled out.

Direct regulation

Once the decision for intervention was made, there were two critical questions. What levels of occupational health and safety should be sought? If regulation is to be effective, what form should intervention take? In writing the OSHAct, Congress took the traditional direct approach to regulation: If the market leads to undesirable outcomes, then market processes must be overridden, and the “wrongdoers” (in this case, the firms) must be made to do the “right” thing. The basic business of OSHA is setting and enforcing a myriad of standards, many of them specifying in excruciating detail the physical conditions of workplaces. Within one month of its creation, OSHA adopted about 4400 “interim” standards from pre-existing Federal regulations and from voluntary codes written by organizations such as the American National Standards Institute. Virtually all these standards were safety-related; adopted en masse under great pressure to do something quickly, without any kind of sensible review, they still constitute the overwhelming majority of OSHA’s standards six years later.

Although these “consensus standards” were included in the OSHAct in part to assuage industry’s fear that OSHA would otherwise act arbitrarily under the “general-duty” clause of the act, they have proved to be the source of many of the agency’s problems. Despite their name, those standards hardly represented an industry consensus. They had been written instead by committees composed mostly of safety experts, with few members concerned with or knowledgeable about production or costs. So long as the

standards were no more than voluntary industry guidelines, no real problems were created, since firms were free to ignore them. But once OSHA made them legally binding, and backed them up with inspections and fines, businessmen were appalled to discover what they actually contained. Some of these standards are trivial and unrelated to worker safety and health, such as the by now famous requirement that toilet seats be split and not round. Others were obsolete long before their adoption by OSHA: One of the most extreme examples was the prohibition (now revoked) against ice in drinking water, which dated from the time when ice was often cut from polluted rivers and lakes. Still others seem unnecessarily complex and difficult to understand, such as the notorious 140-odd standards, many of them highly technical, covering portable wooden ladders. OSHA has succeeded in eliminating, revising, or simplifying some of these standards, but in other cases it has not even kept up with revisions made by the organizations that originally issued them.

Although it adopted the consensus standards in great haste, OSHA now must follow a lengthy, formal process before it can promulgate its own "permanent" standards. Most standards begin with a recommendation from the National Institute for Occupational Safety and Health (NIOSH), an agency within HEW created by the OSHAct that also assembles and (more rarely) performs supporting scientific studies. Although it is optional under the act, OSHA almost always appoints an advisory committee, which issues its own recommendations. By law, such committees must include representatives of both management and labor, but few compromises are struck, and consensus is hardly ever achieved. Typically, the committee members representing labor and the general public (primarily protection-oriented representatives from state government or academic experts) join forces to set the most protective standard possible. As a result, the committees' findings do little to confer legitimacy on the proposed standards, and the trade associations feel free to attack them at the public hearings. Even under the best of circumstances, this process is very time-consuming, particularly with major health standards, and there are often many delays, including court challenges by the affected industries. For example, in 1971 an industry association asked OSHA to develop a coke-oven-emissions standard. NIOSH transmitted its recommendations in early 1973, the advisory committee completed its report in the spring of 1974, and the proposed standard was published in the summer of 1975. The final standard was not pro-

mulgated until October 1976, five years after the standard was initially requested and almost four years after NIOSH presented its recommendations.

Not surprisingly, OSHA has issued only a handful of permanent standards since 1971. Progress was particularly slow in OSHA's first four years, during which it issued only four sets of major standards: three health standards (covering vinyl chloride, asbestos, and a group of 14 carcinogens) and a group of safety standards covering mechanical power presses. More recently, however, OSHA has attempted to accelerate the process, with limited success. In 1975, the head of the agency's Office of Standards Development estimated that about 98 percent of the standards addressed safety rather than health problems. Over the past two years, first under the direction of Morton Corn and now under Eula Bingham, both of whom came to head the agency from academic careers in occupational health, OSHA has emphasized the development of new health standards. No matter how fast OSHA writes health standards, however, it is unlikely to cover more than a tiny fraction of the tens of thousands of toxic substances listed by NIOSH.

Any standard confronts a tension between efficiency and enforceability. Most of OSHA's standards are "specification standards," detailing, for example, the height and construction of certain types of railings. Such standards apply most easily to permanent capital equipment. They are readily enforced, since a single visit to the workplace can determine whether they are being met. A much smaller number of OSHA standards, mostly related to health hazards, are "performance standards," setting, for example, maximum permissible noise levels, but allowing each firm to achieve those levels in the least costly manner. There may be considerable firm-to-firm variation, however, which gives performance standards an efficiency advantage, but makes monitoring difficult, particularly if performance levels fluctuate over time. In some instances, the two types of standard are combined, as in the case of coke-oven emissions, where an exposure limit is coupled with specific controls and works practices. A few OSHA standards cover training and work practices, but such standards are difficult to write, and still harder to enforce.

Critics charge that OSHA's use of standards to regulate safety is misguided because its inevitable emphasis on capital equipment clashes with the belief of most safety professionals that the worker's own behavior, not his work environment, is the prime determinant of accidents. Some safety experts continue to cite a classic

study that attributed almost 90 percent of all industrial accidents to human error, but more recent research emphasizes the interaction of human and mechanical factors. An official of the National Safety Council, for example, estimated (at hearings held by the National Commission on State Workmen's Compensation Laws) that 18 percent of occupational accidents are due to environmental factors, 19 percent to behavioral factors, and 63 percent to a combination of the two.⁵

On a conceptual basis, at least, it is impossible to say whether capital-equipment regulations are more or less desirable, or should be more or less stringent, when other factors, such as worker care, are major determinants of accident rates. Guards on machinery, for example, may be most useful in situations where workers are most careless, and where carelessness is hence the "cause" of most accidents. However, if worker behavior is a critical factor, other forms of regulation, such as incentive schemes to induce employers to improve supervision and training, may prove to be substantially more effective ways of reducing accidents.

Several state studies provide more direct evidence on the potential efficacy of standards in reducing accident rates. In one California study, a panel of state safety engineers concluded from a review of injury reports that only 18 percent of the accidents involved could have been prevented by a fully effective government-inspection program. A report of the Wisconsin state agency concerned with occupational safety and health estimated that only 25 percent of industrial accidents were due to identifiable physical hazards susceptible to inspection, and concluded that worker training and education programs might be more effective. Various follow-up studies of accidents in New York and Wisconsin found code violations in 22 to 39 percent of the cases.

These studies probably place upper bounds on the effectiveness of standards, since no reasonable inspection program will ever eliminate all violations. Two investigators have attempted to determine if states with stiffer regulations and tighter enforcement had lower injury rates prior to the OSHA act. Neither was able to show any significant effects. Although much of this evidence suggesting the limited efficacy of standards in reducing accidents was available at the time of the passage of OSHA act, Congress never considered it.

Unfortunately, no studies were or are available on the efficacy

⁵ This study and several others are cited in National Commission on State Workmen's Compensation Laws, *Compendium on Workmen's Compensation* (Washington, D.C., 1972), pp. 287-288.

of standards in reducing the incidence of occupational illnesses. It may be argued, particularly in the absence of negative evidence, that standards offer more promise for regulating health than safety hazards; in health, a standard can control the hazard itself, rather than some piece of equipment that may or may not contribute to risk reduction. In the health area, OSHA is able to rely much more extensively on performance standards, such as exposure limits. Performance standards, however, are by no means a panacea. The major problem remains one of setting an appropriate exposure level, usually on the basis of very imprecise data. Moreover, monitoring and enforcement may pose particular problems with performance standards. Monitoring itself can prove very expensive. For example, fully one third (about \$40 million) of the estimated first-year operating costs of the proposed benzene standard is simply for measuring exposure levels of employees, the vast majority of whom even now are not exposed at levels above the proposed limit. Another third of the cost would go for medical examinations and tests.

Injuries and illnesses

Congress clearly expected that the standards promulgated and enforced under the OSHAct would yield major gains in worker safety and health; one of the act's authors later expressed a hope for a 50-percent reduction in accidents by 1980. Unfortunately, even the small gains that might more realistically have been wished for have proved difficult to detect. Thus far, no serious attempts have even been made to measure OSHA's impact on the incidence of occupational disease. Although the OSHAct required improved reporting of occupational illnesses, no one believes that the current official statistics accurately reflect the magnitude of the problem. Most cases of occupational illness—particularly the more serious ones, such as cancer—come to light only after many years of exposure to hazardous conditions, sometimes long after the exposure has ended. As a result, many of the cases observed today reflect the conditions of earlier decades; correspondingly, the effect of current exposures will not be felt for many years.

Given the difficulties of identifying which illnesses result from occupational exposure and which from other factors, it may never be possible to obtain accurate measures of OSHA's impact on occupational disease. The best that might be hoped for would be some measure of exposure, which could be coupled with data on

the effects of different dose levels in order to estimate ultimate health impacts. OSHA has not attempted to develop any such measures. Even in the case of individual proposed standards, it generally recoils at the thought of estimating the ultimate health effects. It seems unlikely that OSHA has yet accomplished much in the health area, given the paucity of health standards and the minimal resources devoted to their enforcement. OSHA's impact, however, is likely to grow in the future as it increasingly emphasizes the control of health hazards.

In contrast to occupational health, OSHA's impact on safety, to which it has devoted the bulk of its efforts, should be discernable after six years. Reducing the exposure of workers to genuine safety hazards should have an immediate effect. Three problems confront any attempt to measure OSHA's net effect on occupational injuries and deaths: 1) The OSHA Act included a change in the methods by which injury-rate data are collected, thus frustrating direct comparisons of pre- and post-OSHA data; 2) although OSHA has been in existence for six years, post-OSHA data are available for only four, 1972 through 1975; 3) reported injury rates fluctuate widely from year to year, for reasons only partly understood, making it difficult to attribute small changes to any specific cause.

The post-OSHA injury-rate data fail to reveal any clear trends or dramatic improvements. For example, in manufacturing industries, the rate for injuries serious enough to result in lost workdays rose 7.1 percent from 1972 to 1973 and an additional 4.4 percent in 1974, but then fell 4.3 percent in 1975, for a three-year average annual increase of 2.3 percent—virtually the same as the 1960-1970 average. The lost-workday rate, averaged over the entire private sector, followed a similar path, rising in both 1973 and 1974, then falling in 1975, for no net change. However, the frequency rates for less serious injuries, those not resulting in lost workdays, have shown steady declines from 1972 to 1975, falling a total of 16.5 percent for the private sector as a whole and 16.7 percent for manufacturing.

OSHA has cited these declines and the 1975 decreases in lost-workday rates as evidence of its effectiveness. Such claims might be more credible had OSHA been as eager to take responsibility for the earlier increases, and had 1975 not been a recession year, when injury rates typically decline. In fact, little can be inferred about OSHA's effectiveness from the raw data, since the changes between 1972 and 1975 fall within the range of fluctuations observed prior to OSHA.

Surprisingly few investigators have attempted to measure OSHA's net impact on injury rates; their efforts have relied mostly on multiple regression. Only one study that we are aware of tried to measure the overall impact of OSHA on national injury rates. That study, prepared under contract to the Labor Department, used pre-OSHA data to predict what changes would have occurred in the lost-workday injury rate in manufacturing industries if OSHA had not existed. The actual post-OSHA increases were in fact smaller than predicted, suggesting a positive effect, but the differences were insignificant. That study also tried to measure OSHA's impact, this time in California alone, by focusing on several types of injuries identified by safety engineers as being most susceptible to OSHA's standards-and-inspection approach. It concluded that in 1974 OSHA reduced the California injury rate in manufacturing by at least 2 to 3 percent and cut all occupational fatalities by 5 percent.⁶ Even these modest results must be interpreted somewhat skeptically, however, since the overall estimates excluded those types of "preventable" accidents that actually rose more than expected. Moreover, the results are probably not generalizable, since California runs its own state plan, believed by most to be better than OSHA's, and it had a relatively strong program even before the passage of the OSHAct.

That OSHA has had little or no impact on overall work-injury rates is not surprising, since enforcement is so weak. This is so despite the fact that OSHA devotes three fifths of its budget (excluding grants to state-run programs) and four fifths of its staff to enforcement. During 1976, OSHA compliance officers conducted 76,671 inspections, an impressive sounding number until one realizes that it represents fewer than 2 percent of the approximately five million workplaces covered by the OSHAct. Even when the inspections conducted under state plans are also considered, the average workplace will be inspected only once in several decades.

Given its inability to inspect more than a tiny fraction of the workplaces under its jurisdiction, OSHA has tried to increase its effectiveness by running special programs for particular industries and health hazards. Two such programs, initiated at the agency's outset, have been abandoned. A National Emphasis Program directing more intensive inspections at the high-risk-foundry industry recently got underway as a much touted prototype effort. Un-

⁶ See John Mendeloff, "An Evaluation of the OSHA Program's Effect on Workplace Injury Rates: Evidence from California through 1974," report prepared for the United States Department of Labor (July 1976).

fortunately, by antagonizing industry, it has already lost one of its most attractive features, its design as a cooperative venture among government, business, and labor.

OSHA gives top priority to employee complaints when it schedules inspections. Following the agency's embarrassment over its slow handling of complaints from workers at the kepone plant in Hopewell, Virginia, the proportion of inspections based on complaints more than doubled from 1975 to 1976. However, most inspections are "general-schedule" inspections. The different industries are ranked on a so-called "worst-first" basis, using the expected number of injuries per firm as an index. The procedure is somewhat simplistic, and does not take account of variations across firms in times required for inspections, or in the productivity of inspections in ameliorating dangerous or unhealthful conditions.

A firm need not be inspected, of course, in order to comply with OSHA standards. Some employers will comply simply because it is the law, although OSHA's adversary stance does not foster such behavior, and many firms, particularly smaller ones, are not even aware of all of the standards that apply to their operations. Where standards apply to equipment, firms will normally come into compliance when they replace obsolete machinery. Although OSHA standards apply to the user and not the producer, manufacturers are unlikely to offer equipment that violates standards. In fact, in one case, the manufacturers of mechanical power presses supported a tougher standard on the assumption that many firms would buy new machines rather than modify old ones.

In theory, the fines levied on violators promote what OSHA euphemistically calls "voluntary compliance," a point stressed by those arguing in favor of penalties for first-time violations. In practice, few firms comply before inspection: Between 1974 and 1976, only 21 to 23 percent of inspected firms were "in compliance" when visited. Despite the potentially large fines specified in the OSHA Act, the actual fines levied are very small, averaging \$37.49 per violation and \$188.22 per citation in 1976. Fines levied under OSHA-approved state programs have averaged still less. These tiny fines, coupled with the low probability of inspection and the distinct possibility that a violation will be missed by an inspector, give firms little incentive to comply before an inspection. Firms may also contest the citation or the proposed penalty, and indeed have done so increasingly, by appealing to the Occupational Safety and Health Review Commission (OSHRC), an independent body composed of three commissioners supported by a staff of admin-

istrative-law judges. In 1976 there were more than 5,000 contested cases, over 8 percent of the number of citations issued.

Since OSHA was unable to inspect more than a tiny fraction of covered workplaces during its early years, a more generous test of its potential effectiveness is to examine its impact on inspected firms. Although firms have little incentive to comply before inspections, given the small fines and low probabilities, once cited firms are much more likely to be reinspected, and face far higher fines if they have failed to correct earlier violations.

Two Labor Department economists have attempted to determine whether inspections reduce injuries. They first compared industries inspected intensively under the now-discontinued Target Industry Program with other industries where virtually none of the firms was inspected. The second compared inspected and uninspected individual firms within particular industry-size groups. Neither study was able to show that inspections made a significant difference. Indeed, in both studies more than half of the results showed a perverse effect for inspections.⁷

The evidence available to date is too weak to support a flat statement that OSHA has done nothing for occupational safety. It seems reasonably certain, however, that the gains have not been major, for had they been so even the crude measures available would have been able to detect them. OSHA's impact will, no doubt, grow somewhat over time, but it seems unlikely ever to approach the levels envisioned by the OSHA's optimistic sponsors.

The costs of OSHA

OSHA's apparent inability to secure significant gains in worker safety and health is especially disturbing in view of the costs it has imposed on the economy as a whole. Unfortunately, no comprehensive attempts have been made to estimate these overall costs. This is not surprising given the difficulty of the task, the economic vacuum in which most of OSHA's decisions have been made, and OSHA's understandable reluctance to tabulate its costs.

Compliance with OSHA's regulations can be costly in a variety of ways, including the addition of clerks to maintain required records, decreased productivity due to OSHA-mandated work practices, the purchase of expensive new equipment, and the extensive

⁷ For evidence on effectiveness of the Target Industry Program, see Smith, *op cit.*, appendix C. The second study is by Aldona DiPietro, "An Analysis of the OSHA Inspection Program in Manufacturing Industries, 1972-73," Draft Technical Analysis Paper, United States Department of Labor (August 1976).

modification of existing facilities. These costs are initially borne by firms, but most costs are likely to be quickly passed on to consumers in the form of higher prices. Some of the remainder is likely to come out of workers' wages due to productivity declines. Even if costs come out of profits, workers will be affected both as taxpayers (since lost revenues from the corporate-income tax will have to be replaced by other taxes) and as shareholders. Although individual workers own little equity, their employee pension funds own a great deal.

In 1974, the National Association of Manufacturers surveyed its members concerning the costs of meeting OSHA standards. The mean estimates ranged from \$35,000 for firms with 100 or fewer employees, to \$4.7 million for those with more than 5,000 employees. Shortly after the agency's inception, *Dun's Review*, also relying on business sources, estimated that OSHA would raise costs in many industries by 5 to 10 percent. It cited estimates that OSHA requirements would cost the metal-stamping industry \$6 billion over five years and would add \$2,000 to \$3,000 to the cost of the average new home.

Cost estimates of the sort cited above must be viewed with considerable skepticism, since in most cases firms report anticipated rather than actual expenditures. Moreover, pessimism about OSHA's costs makes good politics for businessmen antagonistic to the agency. Cost estimates prepared for particular standards by consultants under contract to OSHA may reflect the opposite bias. Even those estimates, however, involve large numbers. Noise control is easily the most expensive area. An OSHA-commissioned study estimated five-year capital costs at \$10.5 billion for the current 90-dBA standard and \$18.5 billion for the 85-dBA standard now under consideration. Maintenance costs would add about \$1 billion annually to the cost of the tighter standard. At the current rate of safety-and-health-related capital investment (slightly over \$3 billion per year), the five-year capital cost of the 85-dBA standard would exceed all other safety-and-health-related capital expenditures combined.

Although the noise standard surely involves the most significant costs of compliance for industry as a whole, several other standards also impose substantial costs on particular industries. For example, OSHA has estimated that as a result of its coke-oven-emission standards, the steel industry will incur capital costs of between \$451 million and \$860 million and annual costs in the range of \$173 million to \$1.15 billion, depending on how strictly the standards are interpreted. The proposed inorganic-arsenic standard

would cost an estimated \$111 million per year. The recently proposed new benzene standard would require estimated capital expenditures of \$267 million, with recurring annual operating costs of \$74 million—even leaving aside filling stations and their distributors, who may be covered by the final standard.

OSHA did not voluntarily prepare the cost estimates cited above, but rather was forced to do so by an executive order issued by President Ford in 1974. That order, recently extended by President Carter, requires that all executive-branch agencies prepare “inflationary-impact statements” for major regulatory actions. These statements primarily focus on the effects of proposed standards on employment and, as their titles would suggest, inflation. The price effects of individual standards appear to be minimal for the economy as a whole, measured in tenths of a percent, although they can be quite large for particular products.

The direction of OSHA’s net impact on employment, let alone its magnitude, is unknown. The fear, of course, is that OSHA will cost jobs: Exposure limits may force greater automation of some processes; price increases resulting from OSHA-imposed costs decrease demand and hence employment in some industries; some firms are forced out of business entirely.

The argument made by supporters of stringent regulation—that workers in dangerous jobs need protection because they have no safe alternatives other than unemployment—also implies that those same workers will surely have trouble finding new employment if their jobs are eliminated through government intervention. The inflationary-impact statements on the proposed standards for coke-oven emissions and for exposure to inorganic arsenic illustrate how OSHA standards may cut either way on employment. The inorganic-arsenic standard, OSHA estimates, would result in the loss of 2,900 to 3,700 jobs, with the most severe impact in the arsenical-wood-preservative industry, where employment would decline by about 24 percent. In contrast, it is estimated that the coke-oven standard will increase employment by 5,000 or more because of a productivity decline in coke-oven operations of between 18 and 29 percent. Driving down productivity, however, will strike many as a perverse way of fighting unemployment.

The missing link

Estimates of the costs of OSHA’s standards have little meaning unless they are linked to the benefits provided, measured in terms

of the value the affected individuals and society at large place on increased bodily well-being. The OSHA Act makes no explicit provision for balancing costs and benefits, although the concept that absolute protection should be afforded to workers is qualified in at least two instances; the phrases used are "so far as possible" and "to the extent feasible." OSHA has interpreted "feasibility" primarily in technical terms: Is the technology available to meet a standard? Economic feasibility enters only in extreme cases, when a standard threatens the viability of a substantial number of firms in an industry. The economic feasibility of the proposed benzene standard, for example, is established by reference to the robust financial status of the petroleum industry. It is as though spending dollars does not count unless someone may be forced out of business. OSHA does claim that it considers economic factors in setting the time allowed for abating violations, but again the key consideration is the financial capability of the affected firm or industry, not whether the gains in health or safety justify the expenditure.

OSHA has steadfastly refused to subject its standards to any kind of benefit-cost analysis, repeatedly observing that there is no widely accepted method for assigning dollar values to improvements in health or longevity. While the observation is correct, OSHA's attempt to use it as a justification for failing to integrate considerations of both costs and benefits into its policy decisions is not. The rationale for government intervention in the area of workplace safety and health is not that costs should be divorced from benefits, but rather that some costs and benefits may be misperceived by, or are not borne by, private decision makers.

Fortunately, substantial progress in the reform of OSHA procedures can be achieved without attempting to resolve the problem of valuing lost lives or impaired health. OSHA's procedures have been formulated with minimal concern for economic resources. It should not be surprising, therefore, that there are significant inconsistencies. For a particular firm, compliance with either standard A or standard B may reduce the number of expected accidents by 10 percent per year. Yet compliance with A may cost only a tenth as much as compliance with B. All parties could be made better off if regulatory efforts were adjusted so that means of increasing workplace safety and health with low incremental costs were pursued more vigorously and high-cost measures relaxed, so that the marginal costs were made constant.

This argument is only slightly less compelling when we look across industries or classes of workers. Most would agree that we

should not spend \$5 million to save one life, say through safety railings, while sacrificing another, perhaps through exposure to cotton dust, to save \$50,000. We should aim for what economists would call a cost-effective system, one that achieves the greatest gain for the levels of expenditure it entails.

Significant gains could be achieved if resources were directed where they were most productive. In the hypothetical example above, for instance, 99 additional lives would be saved if \$5 million were redirected from safety-railing expenditures to efforts to reduce cotton-dust exposure. If this process of resource-shifting continued, always seeking the area where the greatest gain could be achieved for a given level of expense, a cost-effective outcome would be reached. One of its significant characteristics would be that the cost of securing additional safety and health would be the same in all areas of expenditure.

We conjecture that greater gains can be achieved by making current expenditures cost-effective than by increasing overall expenditures by, say, 20 percent. The pursuit of a cost-effective strategy would yield an additional benefit: It would automatically generate information on the cost of further increases in the level of occupational safety and health. This information, now unavailable, should be invaluable to Congress and the executive branch in their decision making. It is to be hoped that it would also have a significant influence on OSHA itself.

The process by which OSHA sets standards and the limited role economic considerations play in its deliberations are illustrated by the coke-oven-emissions standard issued last year. The NIOSH criteria document of early 1973 recommended certain specific engineering controls and respiratory protection, but not a change in the existing limit on exposure to coal-tar pitch volatiles. OSHA formed an advisory committee, chaired by Eula Bingham. After 28 days of meeting it submitted its report in May 1975, concluding that since there was no known "safe" level for the carcinogens involved, the exposure limit on the "indicator substance" should be set at the average level found in urban air. In other words, the coke-oven plants themselves would have to have zero emissions. The proposed standard, issued in July 1975, also adopted this zero-emissions approach, although it employed a different indicator substance. OSHA also commissioned an economic-impact study of the proposed standard and held two sets of public hearings. The final standard, promulgated in October 1976, incorporated most of the engineering controls specified in the proposed standard,

but substantially relaxed the exposure limit. In choosing this final limit, OSHA admitted that the only "safe" level of exposure would be zero, but rejected that as not being "technologically feasible." The agency went on to argue that the standard chosen is feasible because when NIOSH measured exposure levels of different workers at the U.S. Steel plant in Fairfield, Alabama, it found them below this limit for each job classification on at least one of the three days that samples were taken. OSHA admitted, however, that many of the samples were much higher, and that the Fairfield plant is probably the "cleanest" in the country.

OSHA's analysis of "economic considerations" is almost meaningless. Estimates provided by OSHA's contractor of the total annualized costs of the proposed standard ranged from \$241 million to \$1.28 billion, numbers that can only be interpreted in relation to the likely gain. OSHA rejected entirely the suggestion of the Council on Wage and Price Stability that it subject the standard to a benefit-cost analysis. In fact, it rejected as inappropriate any attempt "to quantify even a range of benefits of the final rule." OSHA concluded that despite its inability, or unwillingness, to estimate the degree of protection actually afforded, the standard was justified nevertheless since the "substantial costs" are "well within the financial capability of the coking industry" and "are necessary in order to adequately protect employees. Similarly, with the recently proposed new benzene standard, OSHA refuses to estimate whether the required expenditure of hundreds of millions of dollars will reduce the number of leukemia cases by one, by a dozen, or by a hundred.

Although OSHA's refusal to place values on lives or health is understandable, some relatively straightforward calculations suggest that the costs of the coke-oven standard will be far higher than any reasonable estimate of the benefits. Consider first the fact that only 22,100 workers are expected to be directly affected by the standard. Thus the cost per worker protected, using OSHA's cost estimates, is between \$11,000 and \$58,000 *per year*. One suspects that coke-oven workers, who make about \$13,000 per year, could be induced to continue to bear current risks in exchange for far less than even the low estimate. Estimates of the cost per life saved are more difficult to compute because of OSHA's refusal to suggest even a range of benefits. In the inflationary-impact statement, however, OSHA's contractor estimated that 240 deaths resulted each year from coke-oven use, a figure that OSHA later revised downward to 211. Using the latter number, and making

the extreme assumption that the standard will eliminate all deaths, the cost per life saved is between \$1.1 million and \$6.1 million. In its testimony, the Council on Wage and Price Stability—which quarreled with OSHA’s mortality estimates, but also lowered the minimum-cost estimate—argued that a more realistic range would be \$4.5 million to \$158 million per life saved. The witness from the Council contrasted these amounts with the figure of \$240,000 per life used by the National Highway Traffic Safety Administration in estimating the societal costs of motor-vehicle accidents and the \$1 million used as a high estimate by Consumers Union in evaluating the Consumer Product Safety Commission’s proposed lawn-mower-safety standard. The clear implication is that more lives could be saved by spending our resources on safer roads or stronger tires rather than cleaner coke ovens.

Note that the costs of the coke-oven standard were not formally analyzed until after the advisory committee had finished its work and the proposed standard had been issued. Furthermore, the cost analysis examined only one possible standard and did not make any calculations showing the trade-offs between costs and protection at different levels of exposure. The cost per life saved for the most stringent part of the standard is undoubtedly far higher than even the figures cited above.

Most OSHA standards receive much less economic scrutiny than the coke-oven-emissions standard. None of the more than 4,000 consensus standards received any cost analysis whatever before adoption. Even under the executive order requiring inflationary-impact studies, most of the analyses have been designed to show that the economic thresholds that would require preparing a complete analysis are not exceeded. The danger, of course, is that although the economic impact may be “small” relative to the economy as a whole, the gains in worker safety and health, when expressed in comparable units, may be much smaller. Costs cannot be discussed meaningfully without some idea of the benefits to be derived, whether measured in dollars or in other units, such as lives saved or disabling accidents avoided.

One reason for the high cost of OSHA’s standards is the agency’s continued opposition to the use of personal-protection devices, such as respirators or ear plugs, as a means of meeting exposure limits. OSHA’s basic stance is that, wherever feasible, firms must use engineering controls, such as ventilation systems to remove toxic gases, or more rarely, administrative procedures, such as the rotation of workers in hazardous areas. In the case of both the coke-

oven-emissions standard and the proposed benzene standard, for example, OSHA permits the use of respirators only until "feasible engineering and work-practice controls" can be implemented, where engineering controls are not sufficient to meet the exposure limit, or in emergencies. Even in the second case, however, engineering controls must first be installed to lower exposure levels as much as is "feasible."

OSHA's opposition to the use of personal-protection equipment is particularly costly with regard to noise, where relatively inexpensive ear plugs or muffs can provide workers with the same protection afforded by very expensive engineering controls. An OSHA-contracted study estimated that the 85-dBA standard now being considered could be met through ear plugs and muffs at an annual cost of only \$43 million, as compared to the five-year capital cost for the engineering solution of \$18.5 billion. The estimated annual maintenance cost alone (\$925 million) for the engineering solution is more than 20 times as great as the total yearly cost of personal protection.

OSHA's primary argument against personal-protection equipment is that workers may fail to use it because of discomfort or interference with normal activities. Organized labor has been particularly vociferous in its opposition, citing discomfort and arguing that management has an obligation to make the workplace safe. It is difficult, however, to see why OSHA has a responsibility to protect the worker's comfort as well as his health and safety. If OSHA were to permit the wider use of personal-protection devices, significant cost savings could be achieved. If workers find such devices very objectionable, then presumably their use would be a suitable subject for labor-management negotiation, with workers in a strong position to bargain for compensatory wage increases.

Alternatives to standards

On virtually all counts, OSHA has not done its job well. It has done little for occupational safety and health, and it has cost a great deal. An important question is whether the agency's failures have resulted simply from faulty execution (including the overly hasty adoption of thousands of consensus standards, excessive emphasis on safety relative to health, the inevitable start-up problems of any new agency, and, more controversially, the exclusion of economic considerations in all but extreme cases) or whether they were inherent in the basic approach taken: direct regulation

through standards and inspections. Both views have merit, depending on which aspects of the problem are addressed.

If direct regulation is to succeed, it must be undertaken in a manner that gains it wide acceptance and legitimacy. Otherwise, as OSHA's experience makes clear, it is likely to be frustrated, at least for a significant period of time, through noncompliance and through opposing actions that bring about delays in the courts and in other adjudicatory and rule-making bodies. Any effort at regulation will also suffer from administrative underruns. OSHA is frequently chided for its management shortcomings. But even startling gains in management will accomplish little if the basic regulatory approach is flawed. At least two additional approaches should be considered, either as alternatives or as complements to standards: expanded provisions of information and financial incentives. Both of these approaches seek to harness market forces rather than to supersede them.

1. *Provision of information*: Inadequate information may prevent the market from achieving appropriate conditions. The government might provide information in a variety of ways. In some cases it may only need to assemble and analyze existing studies and data. In others, new research—including laboratory experimentation, epidemiological studies, and technical and economic analyses—will be required. The government should also play a role in interpreting and distributing the information thus obtained. This information could be provided through pamphlets and other written materials or through training provided to workers and employers. Such information could be particularly useful where health and safety issues are made part of labor-management negotiations. In some cases the government might require that firms provide particular information or training to their workers.

Current government efforts do include a variety of efforts to provide information. NIOSH conducts and sponsors research, and OSHA itself distributes various training materials and booklets, and offers a limited number of courses for workers and management. These efforts, however, are tiny relative to the resources devoted to enforcement. In part, this represents Congressional sentiments rather than agency choices; over the past several years Congress has made its deepest cuts in those portions of OSHA's budget that relate to the provision of information and analysis.

Provision of information will be complementary to whatever other activities the government undertakes. Better information should increase the efficiency of private markets, and will increase equity

to the extent that it increases workers' awareness of the risks they face, and enables them to demand compensation or protection.

2. *Incentive mechanisms*: Economists frequently argue that where markets fail to achieve desired outcomes, the appropriate solution is not direct control, but rather modifying the incentives faced by market participants. In the 1976 Godkin lectures, Charles Schultze, now Chairman of the Council of Economic Advisors, promoted this approach, using as his title "The Public Use of Private Incentives." In many areas, he argued, incentives would be far preferable to the "command-and-control" systems of direct regulation now used. Incentive schemes secure their efficiency advantage by allowing those who are regulated to select their optimal response. In this way individual differences are respected, freedom of action is enhanced, and the costs of inadequate information on the part of the regulator are substantially diminished.

The principle of levying taxes on offending parties when externalities are involved is well established in economics, particularly in relation to pollution issues, where the taxes are referred to as "effluent charges."⁸ The primary advantage of taxes over a system of uniform standards is that they allow firms to find the most efficient means of reducing the externality, and lead to an efficient outcome, in the sense that for any given level of control, expenditures are minimized. In theory, standards could be set on a firm-by-firm basis to reflect varying costs and benefits; in practice, such a scheme would be unworkable. Taxes also provide firms with an incentive to develop new procedures for reducing hazards still further—unlike standards, which may block the adoption of innovative technologies. Furthermore, a tax system has the advantage that firms that do not or cannot respond to the incentive pay a penalty. Thus even if the injury rate in a hazardous industry is not reduced, the prices of the goods produced will rise, thus shifting demand towards goods produced by less hazardous techniques. (David Lloyd George reportedly noted that workmen's compensation puts this principle to work: "The cost of the product should bear the blood of the working man.")

Incentive mechanisms hold particular promise for occupational safety. As this article was being written, Charles Schultze, Bert Lance, and Stuart Eizenstat gave such an approach a degree of political credibility when in a well-publicized memo they urged

⁸ For a nontechnical statement of the arguments in favor of effluent charges, see Larry Ruff, "The Economic Common Sense of Pollution," *The Public Interest*, No. 19 (Spring 1970), pp. 69-85.

President Carter to supplant OSHA's safety standards with financial incentives. In place of virtually all of its several thousand detailed safety standards, OSHA could levy a tax on employers for each injury sustained by their workers. An injury tax would give firms generalized incentives to improve safety programs, stimulating them to control the whole range of factors that contribute to accidents, not just to control the limited number of physical conditions susceptible to direct regulation. The mix of activities would vary from firm to firm. Some would probably continue to rely solely on the mechanical safeguards required by standards, but others undoubtedly would try innovative approaches, such as safer work practices and new training programs. Moreover, as the cost of accidents rose, safety records would probably become a more important factor in promotion decisions, thus transmitting incentives down to the lowest levels of management. Firms with unusually good safety records, such as DuPont (whose injury rate is only a small fraction of the chemical industry's average), are generally suffused with tremendous safety consciousness at all levels.

An injury tax would be relatively easy to administer. It no longer would be necessary to inspect individual workplaces on a regular basis. Firms could either report themselves, as they do income taxes. Or the tax system could be tied to workmen's compensation claims, where the administrative mechanism is already in place. Tying the fines to workmen's compensation would give workers an incentive to police compliance by their employers.

Even if it is not coupled with a tax to reflect externalities, workmen's compensation should be modified to enhance the incentives for firms to provide safer working conditions, to "make safety pay." But to promote an appropriate level of safety, a firm's compensation costs must reflect its own accident rate, and not simply the average experience of firms of similar size in the same industry. One way of moving towards this goal would be to require that insurance policies for workmen's compensation include significant deductibles and co-insurance rates, both keyed to the firm's size.⁹

What benefits would come from a well-conceived incentive approach to occupational safety? On the resource side, we could avoid the costs of OSHA's irrelevant impositions. There would be gains

⁹ Laurence Silberman, Undersecretary of Labor at the time of the passage of OSHA Act, now believes that federalization of workmen's compensation, coupled with a strengthening of its safety incentives, might have curbed political appetites for federal intervention, thus heading off OSHA as we know it. Silberman also reports that he would have pushed hard for such an approach had he then had his present understanding of economics.

for equity from having workmen's compensation pegged at levels that reflect full economic losses. Occupational safety might improve noticeably—but for any reasonable level of incentive, it is unlikely that the accident rate would be cut dramatically.¹⁰ As distasteful as it may be, given the competing claims for resources, we may have to accept a significant level of occupational accidents as a cost of doing business.

Incentive mechanisms, both taxes and workmen's compensation, are a less promising approach to occupational health. Firms should be taxed for the illnesses their workers suffer as a result of employment. But most cases of occupational illness cannot be distinguished from cases resulting from other causes. The asbestos worker who contracts lung cancer, for example, may be the victim of an occupational illness, but he may also be the victim of general air pollution, cigarette smoking, or his genetic inheritance. Quite likely, his illness results from the interaction of several factors. Even if an illness can be identified as occupational in origin, it may be unclear which employer should be taxed. Black lung, for example, is unquestionably an occupational disease of coal miners, but if a miner has worked in several different mines, it will probably prove impossible to determine which period of employment "caused" the illness.

Given the difficulties of connecting individual cases of illness with particular firms, a tax, if employed, would probably have to be levied on workers' exposure. This approach would be analogous to the use of effluent charges for environmental pollutants. Such taxes would lack many of the advantages of an injury tax, since it would be necessary to set fee schedules for individual substances, and monitoring of exposure levels would still be required. Like an injury tax, however, an exposure tax would achieve cost-effectiveness in a way that standards cannot, by allowing individual firms to achieve different exposure levels depending on their particular costs. For example, Nicholas Ashford, a proponent of strict regulation and generally an enthusiast of standards, testified before OSHA that if an 85-dBA noise standard were imposed, the ratio of costs to benefits (the latter measured in terms of reduction in person-years of hearing impairment) would vary by a factor of 10 across even broad industry classifications. This wide variation suggests

¹⁰ Robert Smith, *op. cit.*, estimates that a tax of \$2,000 per disabling injury would be required to reduce injuries by 8.8 to 12.5 percent. Smith's estimates, however, may be too pessimistic, since they are based on his remarkably high estimates of the wage premiums paid for risk.

that by tightening the standard in industries with low cost-benefit ratios and relaxing it in those with high ratios, the same reductions in hearing loss could be achieved at far lower cost. The beauty of a noise tax would be that this efficient outcome could be achieved through a single tax schedule: Each firm would control noise up to the point where the cost of further reductions just exceeded the tax.

Taxes and other financial-incentive mechanisms need not totally replace standards, an important feature given the continuing political appeal of direct regulation. For example, an injury tax might be coupled with the most sensible current safety standards. In occupational health, such a combination could be employed for the vast majority of hazardous substances for which there is no positive level of exposure that is absolutely safe. A standard, chosen with careful attention to both benefits and costs, would be set as a rigid upper limit. An exposure tax, or some other type of financial incentive, could then be applied to encourage firms to achieve lower levels of exposure where it was cost-effective to do so. By providing appropriate incentives and then leaving decisions to the firm, efficiency is promoted in a number of ways: Regulatory impositions whose costs are well out of line with the benefits provided are avoided; variations among firms and industries in their costs and capabilities for achieving gains are automatically recognized; all possible methods for increasing workplace safety and health are pursued, including enhanced training, changed work practices, and new technologies; and pressure is maintained to achieve further gains.

How OSHA went wrong

It is profitable to review the OSHA experience, particularly as it may contribute to an understanding of the Federal government's more general approach to regulatory issues. The appetite for favorable results is often so enormous that the probability of success seems almost irrelevant when positive government action is contemplated. Indeed, at the time that OSHA was formed, no evidence was presented that even relatively modest gains were achievable. In the political context, hope alone was sufficient to launch a major regulatory intervention. Information that might have helped structure the agency's approach—for example, data on the causes of accidents—was ignored.

The chain of causality in the creation of OSHA ran from per-

ceived crisis, through political pressure, to regulatory response. At no juncture did basic conceptual questions relating to market performance or failure, and the appropriate role for government to assume in response, play an important role in the debate. The lesson, a painful one for economists, is that however relevant or powerful economic concepts may be, they are likely to be ignored when political passions are strong.

In at least three different ways, central lessons of economics were, and for the most part continue to be, ignored at OSHA. First, nothing about the operation of the agency suggests that it recognizes its role as a complement to other predominantly incentive-based mechanisms that were already in existence. The most significant of these is the market and the wage premiums it offers for incurring risks. (For OSHA and its enthusiasts, the subject of compensating wage differentials is more than retrograde; it is taboo.) The principal government-operated incentive system now in place is workmen's compensation. The second neglected lesson is that incentives influence actions. If you inspect only a small percentage of firms, and levy modest fines, few firms will comply voluntarily with the more costly regulatory impositions, particularly if the legitimacy of such impositions is questionable. If you make accidents and health-risk exposure more expensive, employers will make efforts to reduce them. Even if strong incentives fail to accomplish much, we will have learned an important fact that should influence policy: The price of achieving reductions in work-related injuries and illnesses is high. The third elementary lesson overlooked by OSHA is that occupational safety and health are bought at a price. Indeed, OSHA's procedures, particularly its refusal to specify the benefits of its standards, enshrine the fiction that no trade-offs need be made between resource costs and worker protection.

It is easy to diagnose the problem: Virtually all of OSHA's activities affect the allocation of resources, yet it ignores economics, seeing itself in a more missionary role. The OSHAct made a standards and inspection system the preeminent weapon for improving occupational safety and health. OSHA in its first five years concentrated almost exclusively on safety at the expense of health, though the need and justification for government intervention is much stronger in the latter area. OSHA is attempting to correct the second mistake, but unless it also corrects the first, the situation may well be worsened rather than improved. Although the potential gains from health regulation may very well be large, the

costs will be staggeringly high if OSHA continues along its present course.

The solution is less evident. No internally generated effort could be sufficient to get OSHA to make estimated costs and contributions a primary guideline for its interventions, or to give alternative modes of intervention fair consideration. But Congress could rewrite its legislation to make OSHA rely more heavily on incentives, particularly for safety, and to pay appropriate attention to both performance and cost.

Reformers themselves should beware the dangers of optimism. The formulation of any new policy in occupational safety and health, whether to restructure the tasks of OSHA or to stride boldly in a different direction, should start with the recognition that the history of regulation is a history of disappointment. Performance has rarely matched expectations. OSHA may be an extreme case, but it is not an exception.

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