

16.
**Economic Incentives,
Reindustrialization, and Federal
Assistance for Occupational Safety and
Health**

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Economic Incentives, Reindustrialization, and Federal Assistance for Occupational Safety and Health

Economic incentives, tax programs, and financial assistance have all been suggested for stimulating improvements in occupational safety and health, but have been little used in the United States. In addition, the process of industrial change can itself be harnessed as a mechanism for improving occupational safety and health. During a time of reindustrialization, it may be possi-

ble to integrate productivity-improving investments in plant and equipment with the installation of control technologies that safeguard worker health and well-being. Finally, the Federal Government could also establish new programs for financing research and training activities and for assisting small businesses.

ECONOMIC INCENTIVES AND FINANCIAL ASSISTANCE

The general notion behind economic incentives is to use the economic self-interests of individuals and firms to accomplish social goals. For occupational health and safety, the aim is to set incentives so that employers, while seeking to earn profits, will also prevent injuries and illnesses.

In theory the workers' compensation system provides an economic incentive for prevention, but in practice it is limited, especially for illnesses (see ch. 15). Another possible type of economic incentive would substitute an injury tax or an exposure tax for traditional regulatory standards. A third possibility involves the use of various governmental tax policies and financial assistance programs.

Injury/Exposure Taxes

The idea an "injury tax" is generally well-received among economists as a substitute for health and safety regulations (see, for example, **330,425,445,446**). Although the idea has been criticized as politically infeasible (37,300), it has officially surfaced at least twice—in a draft 1976 report of the Council of Economic Advisers and in

a 1977 memo to President Carter from his chief economic adviser, his budget director, and his domestic policy adviser. In both cases, union officials were outraged and the injury tax reference was either deleted or suggested as a supplement, not an alternative, that should be studied by an interdepartmental task force (300). The task force later rejected the injury tax approach (228).

As opposed to the regulatory system, which penalizes firms for violations of regulations, an injury tax system would levy direct financial penalties on firms for each injury. Firms would be free to choose the least costly methods of accident prevention. Under certain assumptions, this would be the most "cost effective" way to reduce the number of injuries. Moreover, an injury tax is appealing because it is directly related to safety outcomes. (Similarly, it has been suggested that effluent taxes or emission fees be used in the area of environmental protection. See, for example, 251.)

The advocates of injury taxes believe them to be better than regulatory standards, which are considered inflexible and unnecessarily uniform

across firms and industries, not necessarily related to workplace or work-force characteristics that cause injuries, and not necessarily the least costly way to reduce injuries (445,446). In addition, an injury tax, if set at an appropriate level, might provide employers with a stronger incentive to prevent injuries than the current Occupational Safety and Health Administration (OSHA) programs. It could also reward employers for efforts to go beyond current regulatory standards, as well as for conducting research on improved controls.

Smith (445,446) concluded that firms do respond to financial incentives and estimated the effect that various levels of injury tax would have on injury rates. To be effective, the taxes would have to be fairly large. Using 1970 data on injuries, Smith estimated that a tax of \$500 per injury would lead to a 2.2 to 3.2 percent reduction in the disabling injury rate (injuries involving lost work time as defined by standard Z-16 of the American National Standards Institute). A tax of \$1,000 would reduce injuries 4.4 to 6.2 percent, while one of \$2,000 would reduce injuries 8.8 to 12.5 percent (446).

Although Smith suggests moderate fines for each injury as a replacement for safety regulation, he does not extend that approach to health regulation. Because occupational diseases often manifest themselves only after a latent period, there would be considerable difficulty in determining which of several employers was responsible for the disease (446). Moreover, as discussed in chapters 2, 3, and 15, there are considerable difficulties in distinguishing job-related diseases from non-occupational ones.

Taxing hazardous exposure levels rather than illnesses might be one possible way to affect job-related diseases. This could work like an effluent or emission tax, under which firms pay a fixed amount for each additional unit of pollution they add to the water or air. Nichols and Zeckhauser (330) have suggested such a tax on occupational noise exposure. But Smith points out that enforcing an exposure tax approach would require a "monumental inspection and monitoring program" (446). The attending administrative costs would probably offset the advantages of such a system. (To a limited extent, provisions of the OSHA lead standard that require paying work-

ers their usual wages if they must be removed from lead-contaminated work areas have some characteristics of an illness/exposure tax.)

An injury tax, even if limited to cases of acute trauma, would encounter serious difficulties. The first would be in setting an appropriate level for the injury tax. Smith (445) estimated in 1970 dollars that a tax of \$1,000 per disabling injury would lead to a decline in injury rates of about 5 percent, while a \$2,000 tax per injury would be associated with a 10 percent decline. Adjusting his estimates to account for inflation since 1970 yields injury taxes in the range of \$2,500 to \$5,000 (in 1983 dollars) per lost-workday injury to achieve a 5 to 10 percent injury rate decline.¹

Furthermore, if a tax for deaths or permanent disabilities were set equal to the lost earnings of the killed or disabled worker, it would be extremely high-ranging from tens of thousands to hundreds of thousands of dollars. These values, large as they are, do not include the psychic costs, the pain and suffering associated with such injuries. To maximize the efficiency of the tax system it would be necessary to prohibit firms from insuring themselves against these large losses to ensure that firms would pay the full tax. But such large penalties would generate considerable political opposition (64).

A second problem would be ensuring the accuracy of the injury records on which any tax would be based. With a direct financial penalty for each injury, employers have an incentive not only to prevent injuries but also to underreport them. (Ch. 2 and Working Paper #1 discuss the controversy about the accuracy of current employer-maintained records.) Independent, firm-by-firm audits to guarantee the accuracy of these data would be quite expensive. Moreover, assessment of the results of an injury tax would be difficult because any declines in injury rates following implementation might represent decreased reporting, not increased prevention (64). In some cases there would also be problems in distinguish-

¹This approximate adjustment for the effects of inflation is based on the two-and-a-half-fold increase in average hourly earnings from 1970 to 1983 and is consistent with the increases during that period in the most commonly used price indexes (the Consumer Price Index, Producer Price Index, and Implicit Price Deflator for the Gross National Product).

ing occupational (and taxable) injuries from non-occupational ones. These would include many sprains and strains, as well as many injuries to the back.

Third, an injury tax might increase the level of controversy in this field. Boden and Wegman (64) argue that it would be politically feasible only for the less severe injuries. Mendeloff (300) suggests that even a tax of \$250 per injury might be more expensive to firms than current OSHA safety standards. In theory, an injury tax should apply to all injuries. But in practice, there would be controversies concerning application of an injury tax in cases of claimed “employee misconduct.”

Fourth, the operation of such a system would be relatively invisible to workers. Employers would calculate the number of injuries and send the Government a check (64). If an injury tax system replaced existing standards, and suspended unannounced inspections and workers’ rights to request “complaint inspections,” it would change dramatically the worker and governmental roles in solving health and safety problems.

Fifth, an injury tax might create an incentive for larger firms to subcontract dangerous jobs to smaller, less financially solvent firms that lack the resources to prevent injuries as well as to pay the injury tax. An injury tax might also lead to changes in employment policies, for example, in hiring and firing decisions. The effectiveness of these policies in reducing injuries has been questioned (64) (see also ch. 4), and such a response by employers may have other social and economic implications that would need to be considered.

Finally, injury taxes have been criticized on ethical grounds. It has been asserted that such a tax would be a “license to maim” or a “license to kill.” By providing a system of “taxes” and “licenses,” society would seem to be saying that it is all right for a certain number of occupational deaths and injuries to occur. But if an injury tax reduced injuries while preserving other social values, it would probably be considered an advance because fewer workers were being harmed.

The operation of an injury tax would also lead to variations in the level of protection that depended on the costs of prevention. Workers in industries facing low prevention costs would have

safer jobs than those in industries with high prevention costs. Job risks would thus *remain* unequally distributed. This, however, runs counter to a commitment to the goal of equal protection for all (277).

Tax Programs and Financial Assistance

When the topic of economic incentives is raised, most employers think of changing the taxes they are most familiar with—the business income tax system. Congress could modify the structure of business taxes to encourage investment in health and safety control technologies or could assist businesses in financing such investments.

A congressional decision to modify the tax structure or provide financial assistance can be thought of as providing some level of “social funding” for investments in occupational safety and health. The general rationale for this is to reduce the costs of health and safety investments, thus encouraging firms to undertake them. Burstein (531) states that tax policy can be used to lower business taxes on certain kinds of investments, thereby increasing the returns to business “to reflect the external benefits provided by the activity.” These external economic benefits, such as reductions in the cost of medical care due to improvements in employee health, are ones that individual firms would not ordinarily receive because companies do not shoulder all the costs of ill health. Some of those costs are borne by employees, by other insurance policyholders, and by the Government. Tax policy might be used to reward the individual firm for actions that reduce these “social costs,”

Many believe that society ought to assist businesses in meeting certain social goals, such as reducing pollution or improving worker health and safety. This is especially true when, for various reasons, society changes the goals by, for example, increasing the stringency of applicable regulations. Thus these tax and financial assistance programs lead to subsidies for businesses, but this may be appropriate to reach socially valued goals of environmental and worker protection.

Four kinds of programs are of interest: investment tax credits, accelerated depreciation, Government loan programs, and direct subsidies. All

have **already** been used in the area of environmental protection and loan programs have been used, to a limited extent, for occupational safety and health.

An investment tax credit allows a business to apply a certain percentage of the purchase price of a capital good directly against the taxes owed by the firm, in addition to the normal depreciation of the investment over time. When firms have been allowed such credits, some of the investments may have included controls for workplace hazards or pollution. However, Federal tax policies have not created an investment tax credit especially for employee health and safety investments, although such credits have been proposed.

Accelerated depreciation or rapid amortization of investments is a second tax subsidy mechanism. This permits businesses to write off the costs of an investment more rapidly than the normal depreciation rules would allow. Federal tax law has allowed 5-year amortization of pollution control equipment (651). This accelerated depreciation for assets that will last longer than 5 years has been permitted only for investments that lead to pollution control without also creating "significant" changes in other aspects of the facility. It has not, however, been available for investments to protect worker health and safety (31).

A proposal to allow accelerated depreciation for OSHA-mandated investments moved through the legislative process to the conference committee stage in 1978. A compromise reached in conference was to request a Treasury Department feasibility study of such a change in the tax law (228). (The major conclusions of that study are discussed later in this section.)

A third kind of Government program is to provide financial assistance, either directly or indirectly. Financial assistance is defined here to mean programs that provide loans or other types of financing (such as bonds) to assist businesses in paying for health and safety investments. Businesses must repay the loans or bonds, but the cost of these obligations is often partially subsidized and they provide a source of capital for investments that may not return a profit to the firm. Private lenders are often reluctant to loan money for such "nonproductive" investments so, it is

argued, the Government has a role in providing such financing.

Financial assistance can take a number of forms, including Government guarantees of private loans, Government interest subsidies for private loans, direct Government loans (often at reduced interest rates), and the use of tax-exempt financing by private firms. In loan guarantee programs, the Government promises to repay a private loan if the borrower defaults. This can be combined with interest subsidies, under which the Government pays a share of the interest costs. Under direct loan programs, the Government acts as if it were a bank and loans the money directly at market interest rates or at a lower, subsidized rate. Tax-exempt financing allows private business to take advantage of the lower interest rates on bonds issued by States and local governments.

When Congress passed the Occupational Safety and Health (OSH) Act in 1970 it concluded that the burdens of compliance would often disproportionately affect small businesses. Rather than exempt such firms from the requirements of the act, Congress chose to amend section 7(b) of the Small Business Act to allow the Small Business Administration (SBA) to make or guarantee loans for OSHA compliance expenditures. The requirements were, first, that the expenditures must be to comply with OSHA regulations and, second, that the small business was "likely to suffer substantial economic injury" without such assistance (OSH Act).

From September 1971 to August 1981, the SBA processed 261 OSHA-related loans for \$72.8 million—about 26 loans per year, each averaging about \$280,000. In fiscal year 1981, 9 loans were made for a total of \$7.1 million.

These loans constituted a very small part of SBA loans. Although exact figures are not readily available, in recent years the agency has been making or guaranteeing between **20,000** and 30,000 loans annually for between \$2.5 billion to \$4 billion. It is possible that some firms have used regular SBA loans to finance OSHA compliance expenditures in addition to other investments. The dedicated OSHA loans, however, usually carried a lower interest rate than the regular loan program (233).

The OSHA loans program, as well as the SBA loans for pollution control, were eliminated by the Omnibus Budget Reconciliation Act of 1981 (Public Law 97-35, Section 1905). It is not clear how effective this loan program was in improving health and safety in the handful of firms that received loans. In 1979, the General Accounting Office (GAO) criticized the program, in part because few loans had been made. In addition, GAO concluded, after an examination of SBA files concerning a sample of loans, that it was not clear that the loans had been granted only to businesses that needed the loans or that the use of the loans actually resulted in the elimination of workplace hazards (509).

Tax-exempt bonds, issued by State or local governments to provide financing for private firms, are backed by the credit of the borrowing firm, the revenue from the project financed, or the value of the facility. Defaults are borne by those who hold the bonds, not the State or local government that issued them. Because the interest on such bonds is exempt from Federal income taxes, lenders are willing to accept lower interest rates. Thus, private firms that use these bonds are able to finance investments at interest rates lower than they would otherwise pay. In 1968, Congress limited the use of bonds that exceeded a certain size to those that finance pollution control and certain public facilities (such as airports, convention centers, parking garages, sports stadiums, etc.) (492).

The Internal Revenue Service (IRS) has had difficulty in administering this provision of the tax code. More than 6 years passed before it published temporary regulations, and they encountered difficulties in ensuring that this financing is limited to pollution control and is not used by firms for "productive investments" (651). The IRS has tended to limit "pollution control" to certain "end-of-pipe" technologies that have no productive value, such as effluent water treatment. More fundamental process changes that also reduce the amount of pollution have generally not qualified for tax-exempt financing (538). The IRS has also disallowed tax-exempt financing for containment devices for nuclear power plants, as well as spending for the disposal of hazardous wastes, because these were considered to be normal expenses for

plant operations, not extra costs due to pollution control requirements.

Despite these restrictions, it has been estimated that about 48 percent of all capital spending for pollution control has been financed with tax-exempt bonds (538). However, the IRS has not allowed tax-free financing for investments that protect employees from toxic substance exposure in addition to preventing environmental damage, apparently on the belief that the company would have invested in worker protection in any case as part of a prudent personnel policy (651). In the last few years, Congress has also enacted several restrictions on the amount of tax-free financing that can be issued by State and local governments to private businesses.

Finally, the Government could assist businesses by giving them direct subsidies or grants. Economists generally prefer direct subsidies to indirect tax subsidies or loan programs because they create fewer market distortions, are simpler for the IRS to administer, and can often be more cost effective. Direct grants do, however, enter directly into the appropriations process and thus may be *more* visible and hence more difficult to legislate. Moreover, a firm will probably incur a greater paperwork burden while applying for a direct grant than it would with an indirect tax subsidy.

As noted earlier, in the Revenue Act of 1978, Congress requested the Department of the Treasury to study the feasibility of tax incentives for occupational health and safety spending. The report, written by the Office of Tax Analysis of the Treasury Department and published in January 1981, was very critical of tax subsidies for OSHA and Mine Safety and Health Administration (MSHA) compliance. It noted that such a subsidy program would be difficult to administer, mostly because of problems in distinguishing health and safety expenditures from normal business costs. Second, the Treasury Department analysis expressed concern that subsidies for capital costs only would encourage firms to adopt unnecessarily capital-intensive compliance methods. Third, they criticized special investment tax credits, accelerated depreciation, and tax-exempt financing on several more technical grounds, including the differential treatment of assets with

different lifetimes, the differential advantage incurred by profitable (as opposed to unprofitable) firms and by capital-intensive (versus labor-intensive) companies, and the large benefit that tax-exempt financing gives to upper-income bondholders (651).

The Interagency Task Force had previously examined the issue of direct economic incentives. In contrast to the negative comments by the Treasury Department report, they recommended, if general economic conditions permitted, both the extension of the investment tax credit to noncapital expenditures for health and safety investments and the creation of a program of direct financial assistance. This should, they suggested, take the form of a direct subsidy rather than a tax credit. The subsidy would be limited to high-hazard firms within hazardous industries, and would only apply to the firm's health and safety spending that represented an increase over their spending in a baseline year. The program could be administered either through the Treasury Department or through the regulatory agencies (OSHA and MSHA) (228). To date, these recommendations concerning financial assistance have not been acted upon.

OTA concludes that the use of tax incentives and financial assistance programs might spur the

implementation of controls, assist businesses in compliance, and possibly reduce the controversy of regulatory proceedings because of the availability of sources of finance. However, there are several disadvantages.

First, they would represent either a reduction in Federal tax revenues or an increase in budget outlays. Second, a tax incentive program would also tend to increase the complexity of the tax law, while a direct assistance program would require personnel and resources for program administration. Third, these programs will often provide financial benefits to firms that would have installed controls even in the absence of a subsidy program. Fourth, there would be difficulties in dividing the purchase price of equipment between features that are health and safety controls and those that are normally part of the equipment for purely productive reasons. Finally, each of these programs has its own limitations, and would have differing effects on other aspects of business investment behavior, as well as on the distribution of wealth, income, and the burden of income taxes. All of these would need to be considered before establishing any program.

REINDUSTRIALIZATION AND OCCUPATIONAL SAFETY AND HEALTH

Some recent discussions of the U.S. economy have included references to "reindustrialization" and "industrial policy." Commentators have generally focused on the international competitiveness of certain U.S. industries—principally in manufacturing. Little of the discussion has been about occupational health and safety policy or even about regulation. But many proponents talk about using economic incentives—including tax law changes and Government financing—to implement the new policies. Moreover, some have suggested changes in health and safety regulations in order to facilitate business reinvestment and plant modernization.

OTA considers the reindustrialization debate to be relevant to this report for two reasons. First, reindustrialization policies might have either a

beneficial or an adverse impact on worker health and safety. Second, if the Federal Government stimulates economic revitalization through tax, expenditure, or financing programs, it may be advantageous to incorporate health and safety considerations into those policies. OTA, in this assessment, is not advocating any form of industrial policy. Indeed, industrial policies and more general economic policies are areas beyond the scope of this report. But there do appear to be connections between these policies and possibilities for improving the implementation of control technologies.

Reindustrialization and Industrial Policy

The terms reindustrialization and industrial policy often have meaning only in the eye of the

beholder. An enormous range of suggestions concerning U.S. economic productivity and international competitiveness have been made under these labels (528). Some think the problem is that the Government has interfered too much in the market through existing tax and regulatory policies. The solution they propose is to reduce the size of Government and limit its intervention to providing certain “public goods,” such as national defense. Others think that economic revitalization can best be achieved by shifting Government policies. These commentators want policies that increase incentives to work and save and that reduce incentives to consume. Specifically, they have advocated across-the-board changes in business tax laws to encourage investment. Some of these suggestions were legislated in the Economic Recovery Tax Act of 1981.

Still another group wants to see explicit Federal policies that will encourage the growth of “sunrise” industries and that will ameliorate or prevent the decline of “sunset” industries. Critics of this position question whether the Government can correctly identify sunrise and sunset industries and some wonder if this is an appropriate role for Government at all. (See 493 and 528 for a discussion of these views.)

All three groups are attempting to create conditions that will lead to economic revitalization, but generally only the third group is advocating selective or targeted industrial policies. These analysts differ in their explanations of what has gone wrong and in their prescriptions for new policies and institutional arrangements. (Some of the leading advocates of industrial policies include Reich (383,384), Magaziner and Reich (283), Rohatyn (395), Bluestone and Harrison (62), and Etzioni (167). For contrasting views, see, for example, Economic Report of the President (169) and Schultze (426).)

The Congressional Budget Office (CBO) has outlined three major strategies that have been proposed as alternative industrial policies. The first is to work with current policy instruments and rely on economic recovery and private-market adjustments to solve existing problems. A second strategy is to “modernize existing policies . . . that may now have become impediments to growth

and efficiency,” including changes in antitrust and trade policy, as well as programs to assist dislocated workers, and changes in *regulatory* policy that would assist businesses in achieving economic growth (493).

A third strategy for industrial policy would involve the creation of new institutions, among which could be an information and/or consensus development agency, an executive branch coordinating agency, and a Government financial institution. An information/consensus agency could gather, synthesize, and disseminate information on American industry, including assessments of U.S. Government policies and of foreign activities. Several proposals would also include creation of a council, composed of representatives from business, labor, and Government, to develop a consensus on the goals of an industrial policy. An executive branch coordinating agency could attempt to coordinate the policies of the Federal Government toward a particular industry or group of industries, in order to encourage growth and competitiveness. The proposed Government financial institution would be a national industrial development bank or several regional development banks, often modeled after the Depression-era Reconstruction Finance Corporation (493,527).

As noted, environmental regulation and workplace health and safety regulation have received little attention in this debate. Magaziner and Reich (283), for example, devote only one paragraph to the issue. In it they call for regulations that apply to “emerging” industries that are “harmonized as far as possible with the needs and requirements of other nations.” “Declining” industries, on the other hand, “should only be required to meet standards that are appropriate to the remaining useful life of the industry.” Bluestone and Harrison (62) note that reindustrialization should be directed toward several goals, including the creation of safer work environments, but they do not elaborate on this point.

Some discussions of industrial policy have, however, advocated the relaxation of environmental and occupational safety and health regulations as part of a plan for industrial modernization. For example, Etzioni (166) has suggested

that the United States must choose whether reindustrialization or improvements in the “quality of life” will be made the Nation’s “top priority.” These discussions assume that Federal regulations have seriously hampered the growth of the U.S. economy and improvements in productivity and international competitiveness. However, as discussed later in this chapter, the adverse impact on productivity of **occupational** health and safety regulation is actually fairly small. Moreover, in some cases OSHA regulation has played a role in inducing or facilitating several industrial innovations that improved both health and safety, as well as productivity.

OTA analyzed the role of technology in international competitiveness in a 1980 assessment on technology and the steel industry and in a 1981 report comparing the competitiveness of three industries—steel, electronics, and automobiles. These reports examined the general issues of technology and productivity in these industries, including the effects of regulatory policies. In the case of steel, OTA found that several major new steelmaking processes are not only more efficient, but also create less pollution. Moreover, modest technological improvements have resulted from the “push” provided by health and safety, and by environmental regulations, including improved emissions controls and better door seals for coke ovens (538). More generally, the 1980 report outlined a number of policy options.

The most critical policy option may be that of a governmental steel industry sector policy, that is, for a coherent set of specific policies designed to achieve prescribed goals. . . . The lack of a sector policy and the designation of a lead agency to implement such a policy has led to policies that often conflict with one another, create an adversarial relationship between Government and industry, and fail to address critical issues.

In its comparison of the competitiveness of steel, electronics, and automobiles, OTA outlined two prerequisites for industrial policy (543):

- mechanisms for reaching agreement on **objectives** that are acceptable to Government and various interest groups; and
- improved **analytical capability** on the part of Government agencies concerned with economic efficiency and competitiveness.

In addition to taxation and spending policies, Congress and the executive branch have already created programs that might be considered forms of industrial policy and **have** considered others. For example, there are already a large number of Federal programs that provide grants, loans, loan guarantees, and economic assistance for various purposes (512,529).

The Steel Tripartite Advisory Committee, appointed by President Carter, consisted of representatives from Government, labor, and business who discussed issues concerning modernization of the U.S. steel industry. Among other recommendations, they suggested delays in several environmental protection requirements in order to facilitate plant modernization (458). In 1981, Congress enacted the Steel Compliance Act, which postponed certain deadlines of the Clean Air Act for the steel industry.

Finally, a number of bills have been introduced in recent sessions of Congress concerning industrial policy (see 534). Hearings have been held on some of the topics addressed by these bills (513, 515,525,534,549).

Reindustrialization and Occupational Health and Safety

The continuous process of industrial change (including the replacement of plant and equipment) can lead to safer and more healthful workplaces. In fact, a large portion of the improvements in worker health and safety during this century may **not have been the result of conscious decisions to add controls to existing processes, but may have occurred coincidentally as new technologies, new processes, and new industries were introduced.** Unfortunately, it is extremely difficult to gather definitive data on this question.

Industrial and other policies that facilitate the process of industrial change might simultaneously improve occupational safety and health. Moreover, regulations can have a favorable impact on the productive efficiency of an industry either because they directly spur innovations and changes or because they provide an opportunity to change productive aspects of plant operations. But there is some danger that combining policies that are

designed to improve productivity with those that address employee health and safety will lead to an emphasis on the former at the expense of the latter.

Industrial change does not automatically improve worker health and safety, nor are new plants necessarily safer than old ones. What is true is that it is generally cheaper and more effective to control any given health and safety hazard when constructing new plant and equipment than it is to retrofit existing plant and equipment (see box U).

By stimulating changes in plant and equipment for productivity reasons, new industrial policies

may also present an opportunity to improve worker health and safety. The various tax incentives, loan guarantees, and other subsidies that have been suggested to improve industrial competitiveness might also be used as incentives for health and safety improvements. Such policies can thus make compliance with health and safety regulations easier. In addition, if desired, the opportunity presented by reindustrialization could be used to achieve greater levels of protection.

It has been argued that health and safety regulation has hampered economic productivity by requiring expenditures for control technologies that are “nonproductive.” Money spent for controls could have been invested in improving plant pro-

Box U.—The Costs of Add-On and New Process Controls

It is widely believed, indeed it is pretty much common sense, that controls are cheaper and more effective when designed into new plants than when added or retrofitted. Nearly every control that could be included as a retrofit could also be included in the design stage. There is no reason to believe that it would cost more to purchase a control for a new plant of the same size with the same hazard than it would be to buy the control for an older plant,

Second, in designing the new plant, the architects, designers, and engineers have a greater opportunity to make sure that everything “fits together.” For example, ventilation systems can be designed efficiently rather than having to wind their way around existing equipment, building structures, or other duct work. Work stations and tasks can be designed with ergonomics in mind (see ch. 7) to enhance worker productivity and to be less stressful. Thus the design can improve a number of different features, including employee health and safety.

Third, installing retrofit controls always involves disruptions-cutting through existing equipment, temporarily closing down portions of the plant (or paying overtime rates to have the work done on weekends or at night), or taking machinery apart-that can be very costly. Fourth, retrofit controls can easily outlive the rest of the plant and equipment, especially in older facilities. Thus the plant's life may end before the firm has reaped the full life of the control devices. For some devices there will be a salvage market, but for many there will not.

OTA has found several examples to support this reasoning. Rollover protection for mining vehicles is more expensive when retrofitted than when purchased on new equipment (248). In the OSHA vinyl chloride rulemaking hearings, the Firestone Plastics Co. estimated that reaching a 100 parts per million standard would cost 34 percent more in a 25-year-old plant than in an 8-year-old one; meeting a 10 parts per million standard would cost twice as much in the older plant (38). Swedish research in the 1960s led to “designed-in” noise control for one company that cost only a fraction of what retrofit controls would have cost (228).

Direct comparisons of the costs of control in new plants versus retrofitting old plants are often difficult, however, because other relevant variables change. For example, the new plant may be larger or have a different production process. A comparison of the experience of two plants in controlling radiation exposures illustrates this. Retrofitting an old uranium processing plant to meet new, more stringent radiation exposure standards cost approximately 30 percent as much as the original total cost of the plant. Later a new plant was built to meet the same radiation standards. The control costs for this plant amounted to only 8 percent of the new construction costs. But there were confounding variables: the new plant was larger and had at least one significantly different type of process equipment (97).

ductivity. In the aggregate, however, this diversion is relatively small. Employee health and safety regulations have been estimated as having led to a 0.4 percent decline in traditional measures of productivity (137). Of course, these measurements do not capture any of the health and safety benefits of regulation (see additional discussion in ch. 13).

But compliance with regulations can also provide an opportunity to make changes that improve plant productivity. As one group of analysts has noted, “[b]ecause it is less expensive and disruptive to make multiple changes simultaneously, rather than individually, businessmen naturally **take the opportunity of regulation to introduce other improvements**” (31). (See 228 for several examples for which productivity improvements occurred at the same time as health and safety improvements.)

According to several studies, regulation can stimulate new research or, more likely, speed up the tempo of existing research. One group of researchers reports that 33 percent of their study’s respondents indicated process improvements spurred by regulatory changes (231), while two other studies reported similar conclusions (70,101). In a five-country comparison of Government activities that affected innovation, the researchers concluded that regulatory requirements concerning environmental protection “may be more important” for inducing innovation than other programs that were designed explicitly to influence the innovation process (29).

Ruttenberg (412) has pointed out a number of instances in which regulation has been a stimulus for new markets, new jobs, and basic product and process innovation. “To a surprising degree, regulation is the mother of invention,” she noted. This occurs because in redesigning products and processes to comply with health, safety, and environmental regulations, companies often fundamentally redesign the product or process through the use of new technology. Second, the existence of Government standards creates “assured markets” for the results of the research efforts.

In the OSHA arena, the stimulus of the vinyl chloride regulation accelerated a then-developing improvement in polymerization technology. Some

of the controls that were applied to reduce vinyl chloride exposures also increased production efficiency. (See box N in ch. 12.)

Ruttenberg’s case study of the OSHA cotton dust standard, commissioned for this assessment, reveals a similar phenomenon. Although a direct cause-and-effect relationship is difficult to prove, it seems clear that the recent modernization of the American textile industry was at least accelerated by the OSHA cotton dust standard. Compliance with the standard involved, in large part, the installation of new and more productive capital equipment. Some “nonproductive” investments (such as for additional ventilation) have been required, but process and equipment changes included in new designs have substantially lowered cotton dust levels. This new equipment is also more productive because it consolidates several previously separate processes, reduces energy consumption, operates faster, and produces cloth of improved quality. Although the new technology has some limitations, the textile industry has been able to raise productivity and improve worker health and safety at the same time (413).

A recent report to OSHA concerning the costs of complying with the lead standard discusses the potential for new technology simultaneously reducing worker exposures, reducing the costs of controlling exposures, and improving productivity in a primary lead smelter (see box V). It must be noted that this technology has not yet been implemented on a large scale and there are uncertainties about its adoption. But what is not seriously questioned is that process redesign is the most effective way of achieving both productivity and employee health and safety goals.

As previously noted, industrial policies would require not only agreement among the affected parties, but also analytical capability. The National Institute for Occupational Safety and Health (NIOSH) and the Environmental Protection Agency have developed a methodology for industry-specific research planning (220). The general objectives of this work were to improve the coordination of environmental and occupational regulations and to identify health and environmental problems and solutions at an early stage. Although the focus of this project was research

Box V.—Reducing Lead Exposures: Add-on Controls v. New Processes

The OSHA lead standard sets a limit for occupational lead exposures at 50 micrograms of lead per cubic meter of air (50 micrograms/m³). In a study done for OSHA, Charles River Associates (103) (discussed by Gobel, Hattis, et al. (184)) examined work exposures and controls in a primary lead smelter with an annual capacity of 225,000 tons. The highest exposures, considering both the number of workers exposed and the exposure levels, occurred in two departments—the sinter plant and the blast furnace area. The Charles River Associates report compared the costs and emission reductions expected from using each of two methods of moving toward compliance with the lead standard.

The first method considered was conventional “add-on” or “end-of-pipe” control technology. None of the manufacturing process would be changed, and no new production equipment would be installed. Instead, enclosure and ventilation systems would be added to separate workers from airborne lead or to dilute it to acceptable levels. The second method considered a number of new technologies, which involved new production machinery, to smelt lead. Installing new production machinery would reduce worker exposures more than add-on controls

would, and the new machinery also achieves some savings in labor and materials costs and an increase in income from the sale of sulfuric acid (a byproduct of lead smelting). But at the same time, the capital costs of new production machinery are higher (table 16-1).

The difference in costs might be reduced by current tax preferences for investments. Investment tax credits and rules concerning depreciation for capital investments might offset some of the costs of new machinery than of add-on controls, but the quantitative impact of those preferences was not calculated. Moreover, changes in the tax laws to encourage health and safety investments might have an additional effect.

If a new smelter is to be constructed, both health and economic considerations would favor the new Machinery. Its construction cost and the cost of a conventional smelter would be similar, and its reduced emissions and reduced operating costs would sway the decision. But installing the new process in an existing smelter, given the economic factors, would require a careful weighing of tax advantages and the other capital and operating costs.

Table 16-1.—Summary of Costs for a Smelter Equipped with Add-on Controls and a Smelter with Process Changes

	Annual costs in thousands of dollars	
	Smelter equipped with add-on controls	Smelter with process changes
Capital and operating costs associated with control devices:		
Control system, capital cost, assuming 12%/yr	2,439	1,348
Control system, operation and maintenance	1,734	1,017
Materials (savings)	—	(4,671)
Labor (savings)	—	(3,420)
Acid byproduct (increased income)	—	(2,476)
Total	4,173	(8,202)
Annualized capital cost of process change:		
With interest at 12%/yr	—	16,735
Total annual costs	4,173	8,533

SOURCE: (184).

planning for two agencies, the general idea could be extended to other Federal financial and regulatory policies. In particular, the methodology follows the industry breakdown used in the Commerce Department's annual report, *U.S. Industrial Outlook*, and develops a series of indicators that could be used to coordinate Federal policies.

A Federal Interagency Task Force on Workplace Safety and Health recommended in 1978 that OSHA take steps to identify hazards for which engineering controls could be installed along with the normal replacement of plant and equipment (228). Both types of analytical work might be usefully considered in developing industrial policies.

OSHA regulations can also be designed to consider the capital and investment cycles of plants and firms. To some extent, the use of delayed implementation schedules takes these concerns into account. Industries then have some flexibility concerning the timing of engineering controls. Feasibility is an important consideration in such cases: something that may not be feasible in 6 months may be feasible in years. One suggestion, made in the OSHA proceeding concerning noise exposure rulemaking, is the possibility of different permissible exposure limits for new and old plants. Such "grandfathering" may ease the compliance burden in old plants but needs to be done cautiously lest it create an unwanted incentive for continuing the operation of inefficient, older plants. In addition, it tends to create two classes of protection, with workers in new plants being protected more than workers in older facilities.

As described in chapter 1, this assessment suggests several options related to occupational

health and safety, industrial policies, and reindustrialization. First, if funds or tax incentives are created for the building or rebuilding of industry, applications for those benefits might be required to include a discussion of methods to be used to control expected health and safety hazards. These funds could be extended to expenditures for control technologies to reduce those hazards. Second, companies receiving reindustrialization assistance might be required to design health and safety into their new plant and equipment, either to meet existing health and safety standards, or to achieve lower exposure levels or safer processes.

Two other options consider the relationship between OSHA regulatory actions and reindustrialization. Because of the potential for improving health and safety, as well as productivity, during the process of modernization, OSHA regulatory actions could consider explicitly the capital and investment cycles of plants, firms, and industries. Information could be developed concerning the health, safety, investment, and productivity needs of various industries. In particular, if studies show that an industry is going to make major changes to improve productivity, OSHA might consider delaying the required attainment of a standard through engineering means until the modernization is undertaken. Alternatively, OSHA regulations might be used to spur the development of new technologies and accelerate the process of industrial change. The history of OSHA's vinyl chloride and cotton dust regulations shows that, at least in some cases, employer efforts to comply with health and safety standards can also be associated with productivity improvements.

FEDERAL AID FOR RESEARCH AND INFORMATION DISSEMINATION

Creation of an Occupational Safety and Health Fund

The advisory panel to this assessment expressed concern about the large swings in occupational safety and health policy that have occurred re-

cently. Funding has been reduced for two areas in particular—education and training programs, and research on workplace illnesses and injuries. One way to provide for more stable and enhanced funding would be to establish an Occupational Safety and Health Fund. This fund might also pro-

vide a focus for the enhanced efforts in control technology research, education and training, and information dissemination.

The Work Environment Fund of Sweden offers a possible model for a U.S. fund (468). Sweden, partly because of its commitment to providing extensive education and training, as well as funding for research on hazards and controls, is viewed by many as an international leader in occupational safety and health. Two organizations are particularly responsible for these activities. The first is the Work Environment Fund itself, established in 1972, which is funded by a payroll tax on employers of 0.155 percent. The fund is administered, in typically Swedish fashion, by a tripartite board composed of representatives of management, labor, and Government.

In its first 10 years, over 1,800 research and development projects and about 1,500 for training and information were funded. The research and development grants have included funding of epidemiological and toxicological studies, measurement techniques, and development of control techniques for a variety of hazards. In recent years, these have focused on the hazards of working with various chemicals, including solvents, metals, minerals, welding and cutting products, and rubber and plastics. The fund has also sponsored work on physical agents, including noise, vibration, radiation, and in issues concerning ergonomic design related to working postures and lifting requirements (468).

The training and information projects have included the development of course materials for the introductory and advanced training of worker safety stewards and supervisors. From 1972 to 1981, nearly 400,000 individuals received some form of training. The Joint Industrial Council, which was created by an agreement of Swedish employers and unions in the 1940s, has produced most of the educational materials concerning workplace health and safety used for this training (468).

There are only a few U.S. examples of cooperative labor-management-Government research and training activities related to health and safety. One example is a set of experiments concerning the use of "washed cotton" to control the hazards

of cotton dust. This project is funded by both Government and industry, with oversight and direction provided by a group of labor, management, and Government officials. There have also been jointly administered research efforts and training programs that have resulted from collective bargaining.

Congress could consider several possible administrative arrangements if it created a fund. It could follow the Swedish model by creating a tripartite board to administer this fund, or it could delegate administrative responsibilities to NIOSH or OSHA. It could create this fund and its research and training projects to exist alongside the existing projects and arrangements at OSHA and NIOSH, or it could consolidate with this fund all existing research and training, including NIOSH extramural research grants, NIOSH training grants, OSHA New Directions grants, and OSHA-funded consultation.

Financing could be through a payroll tax on employers or through a tax or surcharge based on the level of workers' compensation premiums paid by employers (with some adjustments for the presence of health hazards in various industries). For example a 0.1 percent employer tax on the total U.S. payroll of \$1.6 trillion (in 1982) would result in annual revenues of about \$1.6 billion. A payroll tax of 0.01 percent would raise \$160 million. A 1.0 percent surcharge on workers' compensation premiums (about \$25 billion in 1980) would produce annual revenues of \$250 million.

Assessments for health, safety, and environmental activities have been used in the United States in at least two cases. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 created a "superfund" to pay for activities related to releases of hazardous wastes. Most of the funding for this is from taxes on oil and chemicals (546). The recently enacted right-to-know law in the State of Washington includes an assessment of 75 cents for each employee in the State, to be paid by employers (351). One bill concerning asbestos compensation, now under congressional consideration, proposes establishing an assessment to be used for research (517).

Although creation of an Occupational Safety and Health Fund would enhance the commitment

to **research and training** in this area, there are disadvantages to consider. The relationship between this fund and the existing agencies (OSHA and NIOSH) would need to be determined. Moreover, **a new tax or surcharge**, even though one of modest size, runs against recent reductions in business taxes.

Federal Assistance to Small Businesses

Improvements in employee health and safety can be difficult for smaller businesses, which often lack technical expertise in industrial hygiene, safety engineering, and occupational medicine. Smaller businesses commonly face financial difficulties as well.

As discussed above, from 1971 to 1981, the Small Business Administration issued a limited number of loans to assist small businesses in complying with **OSHA** standards. In 1981 Congress eliminated authorization for this program. One option would be to study the results of this loan program, especially to learn why it was used so infrequently. After such a study, Congress could consider reauthorizing the loan program and providing an adequate level of funding.

Other kinds of Federal assistance for small business could include providing technical assistance and facilitating the creation of programs to provide technical assistance. Chapter 12 discusses OSHA consultation, which is the major OSHA activity for providing assistance to small businesses.

SUMMARY

Several approaches to improving occupational safety and health have not been extensively used in the United States. These include the use of economic incentives, tax incentives, and financial assistance. Although in theory the workers' compensation system provides an economic incentive to prevent worker injuries and illnesses, in practice it provides only a limited economic incentive for prevention, especially for occupational illnesses.

Another possible type of economic incentive involves injury or exposure taxes. As a substitute

NIOSH and OSHA could also encourage the development of programs to provide industrial hygiene, safety engineering, medical surveillance, and worker health and safety training. These could be established to service industries, regions, and employers who do not offer such services. Especially helpful would be programs for servicing small businesses in particular areas.

Because it is inefficient and impractical to require each small business to provide a full range of safety and health services, programs to provide shared resources might be cost effective. Federal funding could be used to start such programs. However, there may be difficulties in sustaining these programs after the startup period. Even though the price of shared programs should be less than if a company were to purchase the services entirely on its own, some small businesses might find it beyond their means. The steps that are needed to aid those companies are not addressed by providing shared resources.

As discussed in chapter 15, the regulation of the products purchased by small businesses may also be a way of improving, to some extent, the health and safety of their work forces. This approach could also be applied to nonregulatory testing programs. For example, NIOSH could conduct occupational safety and health performance tests of products used by small businesses and publish the results in a fashion easily accessible to small businesses, which could then use the results of these tests in purchasing decisions.

for the regulatory system, which penalizes firms for violations of regulations, an injury tax system would levy a direct financial penalty on the firm for each injury. Such an approach appeals to many economists, but it presents a number of difficulties.

Congress could also modify the structure of business taxes to encourage investment in health and safety control technologies, or it could provide direct assistance to businesses in financing health and safety investments. Either decision would provide some level of "social funding" for

investments in occupational safety and health, thus reducing their costs and encouraging firms to undertake them. Four kinds of tax and assistance programs could be considered: investment tax credits, accelerated depreciation, Government loan programs, and direct subsidies. All have been used to stimulate adoption of pollution controls, and loan programs have been used, to a limited extent, for occupational safety and health.

Tax incentives and financial assistance programs might spur the implementation of controls, assist businesses in compliance, and possibly reduce the controversy of regulatory proceedings because of the availability of sources of finance. However, they would cause either a reduction in Federal tax revenues or an increase in budget outlays and could increase the complexity of U.S. tax law or increase administrative burdens. Moreover, these programs can be inefficient, and would affect other aspects of business investment behavior, as well as the distribution of wealth, income, and the burden of income taxes.

Federal policies concerning reindustrialization might have either a beneficial or an adverse impact on workplace health and safety. It is possible that many of the improvements in worker health and safety during this century occurred coincidentally with the introduction of new technologies, new processes, and new industries and not as the result of conscious decisions to add controls to existing processes. A time of reindustrialization offers opportunities to integrate productivity-improving investments in plant and equipment with the installation of control technologies, as well as to exploit the fact that it is cheaper and more effective to control a hazard when designing new plant and equipment than it is to retrofit existing operations. Reindustrialization also affords an occasion to achieve greater levels of protection. However, there is also the danger that combining policies that are designed to improve productivity with those that address employee health and safety will lead to an emphasis on productivity at the expense of health and safety.

Health and safety regulation may have negative effects on productivity, by requiring spending for controls that are “nonproductive,” compared with traditional measures of productivity. But in the aggregate, this diversion is relatively small, and may, in many cases, be offset by regulation-induced changes that improve plant productivity as well as employee health and safety protection. Facing the need to redesign products and process to comply with health, safety, and environmental regulations, companies may fundamentally redesign product *or process* through the use of new technology. For both the OSHA vinyl chloride and cotton dust standards, employer compliance was associated with improvements in productivity. For the lead industry, it is possible that new technology could be introduced that would simultaneously reduce worker exposures, reduce the costs of controlling exposures, and improve productivity.

Financing for research and training activities and for assisting small businesses could be provided by an Occupational Safety and Health Fund. The Work Environment Fund of Sweden offers a possible model for a U.S. fund that could provide a new focus for enhanced efforts in control technology research, education and training, and information dissemination.

Small businesses face special problems in making improvements for employee health and safety. They often lack technical expertise in industrial hygiene, safety engineering, and occupational medicine, and they face financial difficulties as well. Assistance to such firms could include Government loan programs, consultation, and Government testing and regulations of products purchased by small businesses. In addition, OSHA and NIOSH could encourage the development of programs to provide industrial hygiene, safety engineering, medical surveillance, and worker health and safety training to small businesses, especially in regions currently lacking such services.