

Center
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Business



*Technology
and a Safe Workplace*

by Richard K. Vedder

Policy Study
Number 156

August 2000

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Introduction

While policy analysts have put forth several rationales for federal occupational safety and health regulation, the American workplace has steadily become much safer, diminishing any such rationale.¹ This has been aided by the macroeconomic effects of technology on increasing productivity and real income per capita, changes that have implications for the nature of work and worker safety. Also, we can observe effects of technology in specific industries and the fact that technology advances the viability of resolving safety issues by private, voluntary means.

In 1960, the United States government spent very little on regulating the health and safety of American workers. Today, four decades later, regulatory efforts have expanded exponentially, with a whole new bureaucracy, notably the Occupational Safety and Health Administration (OSHA), created to enforce workplace practices. In the related area of worker standards and benefits, government spending also has risen sharply in real terms. These efforts, however, appear to have had little impact on worker safety.

By any measure, occupational safety and health were improving rapidly in the era before the major increase in government regulation...Technologically-induced structural change has solved many of the problems envisioned at the time of OSHA's creation in 1970.

In this study, two major themes are developed. First, by any measure, occupational safety and health were improving rapidly in the era *before* the major increase in government regulation. Economic growth that reflected technological change and capital formation was reducing the very problem that regulation was designed to solve. Second, while the trend toward greater safety has continued, it reflects in large part shifts in the nature of work rather than regulatory success. Technologically-induced structural change has solved many of the problems envisioned at the time of OSHA's creation in 1970.

Richard K. Vedder is adjunct fellow at the Center for the Study of American Business and Distinguished Professor of Economics at Ohio University.

Why Regulate the Workplace?

In order to understand the arguments for regulation, it is desirable to first outline the case made for *no* governmental regulation, with market forces providing incentives to promote worker safety. Workers prefer safer work environments to more dangerous ones, other things equal. To compensate workers for increased danger, employers must offer higher wages. For example, a 10 percent added pay differential is typical for a job with a moderately high risk of occupational illness compared with one that is risk-free.² Higher labor costs, other things equal, mean lower profits and stock prices. Employers have a significant incentive to carry out safety improvements.

Workers who are risk takers and/or want high incomes will gravitate toward jobs where the workplace is relatively dangerous, while risk-averse workers will trade lower wages for greater safety. The wage differential foregone by workers in the lower-risk job is like an insurance premium paid to reduce the probability of occupational injury, sickness, or even death.

Thus workers themselves consciously choose risk levels of employment. Moreover, a large majority of workplace accidents reflect worker carelessness or temporary unanticipated physical hazards (e.g., a wet floor), so that the potential impact of government regulation is relatively modest.³

The tort system provides recourse for workplace negligence and another incentive for the employer to increase safety. With mandatory worker's compensation that is experience-rated, employers with dangerous work environments face explicit insurance premium costs as well. Safety is often profitable: tight-fisted employers who could provide a much safer workplace at modest cost suffer losses from having to pay high wages—and sometimes high tort judgments to boot—to induce workers into the relatively dangerous occupational milieu. Safety is not a moral or economic absolute to be achieved whatever the cost. Rather, workers and employers will seek increased safety as long as both sides agree to continue in the working relationship. As the value of human life grows over time with the rise in earnings associated with economic growth, safety concerns rise as well. Still, some risks to worker safety will be tolerated because the costs of eliminating them are high.

Information Cost Arguments for Regulation

As Viscusi puts it, "The principal limitation of the compensating differential process is that appropriate risk premiums and effi-

cient matchups of jobs and workers may not result if workers are not fully aware of the risks they face.”⁴ If workers are ignorant or misinformed about occupational dangers, they might accept jobs at a pay rate lower than what they would require if they had a more accurate understanding of the dangers. Often, employers themselves are unaware of the precise information needed to make an appropriate occupational safety decision. For example, suppose a firm is considering a new technology that it guesses will reduce accidents by 20 percent—but in fact it reduces them by only 5 percent, or by 40 percent. The firm may underutilize or overutilize the new technology.

Proponents of governmental occupational safety regulation argue that firms do not adequately inform workers about safety, in part because of an externality or free-rider problem. Why should firm X invest in research on job safety for its employees if firm Y can then use the same information without incurring research costs, or if employees move to competing firms? The information problem is particularly acute for production processes involving materials, such as chemicals, that have long-term health effects that are difficult or costly to detect.

It is argued that in the unhampered market economy workers will not be adequately informed—there are problems of “asymmetric information.” Workers learn a good bit about risks that are obvious—those of falling off ladders, for example—but less about risks that are hidden and long term, such as the long-term health effects of chemical solvents on the lungs.⁵

Adverse Selection Arguments

One of the oldest governmental programs dealing with occupational safety and health is workers’ compensation. Why do we mandate that firms pay into an insurance fund to provide compensation to injured or sick workers? It is argued that if worker injury insurance were voluntary, firms that provide an extremely safe work environment would not participate, leaving only the firms with dangerous work settings in the pool, leading to extremely high rates, bankruptcy in the insurance fund, or both. Government coercion is necessary to overcome the problem of “adverse selection.”

Briefly Evaluating the Arguments

I believe that the foregoing arguments for government intervention are either overstated or incorrect. The “information cost” argument has a basic truth to it: agents do often make mistakes and errors due to want of better knowledge. In many cases, however,

that is an inherent problem that governmental involvement does not solve. Moreover, with the revolution in communications technology, the worker interested in learning about the safety of different occupations can often readily obtain it at little or no cost, for example via the Internet. Suppose I were interested in working in an automobile manufacturing plant. How safe is it to work in that environment? Within five minutes of Internet searching, I learned through the *Statistical Abstract of the United States* that the job injury rate in such plants is more than three times the average for all U.S. industries. High-tech information sources aside, economists have recognized for decades that most labor market information is communicated relatively effectively and cheaply through informal channels by colleagues, friends, and relatives.⁶ Also, as will be discussed below, the private sector can and does provide enormous amounts of information about the level of risk and risk avoidance, information that is useful to employers as well as employees. I learned quickly via the Internet, for example, that the J.J. Keller Corp., an 800-employee firm specializing in occupational safety issues, was running a workshop within 75 miles of my home “designed specifically for those who need to train employees on how to safely and properly operate powered industrial trucks (forklifts),” one of 14 seminars offered by that company on safety issues in the immediate future in my home state of Ohio. Thus even if there is an information problem, the solution may well be not to rely on governmental agencies.

An argument could be made that government would allow for more intelligent private decisions by merely providing the private sector with information.

An argument could be made that government would allow for more intelligent private decisions by merely providing the private sector with information. However, OSHA and other agencies have been widely criticized for adopting one-size-fits-all rules that mandate or prohibit certain types of activity, regardless of costs or benefits.⁷ In focusing attention on their narrow objective, government bureaucracies often cause new problems, such as inefficiencies associated with rules that are at best marginally effective. The following quotations from studies done in the first decade of OSHA's operation are illustrative:

There is little evidence...that this added attention...has yet produced or is likely to produce a substantial improvement in the safety or health of most workers. ...The studies in the volume...raise serious questions regarding the effectiveness of regulation in promoting optimal resource allocation. ...There is surprisingly little evidence of strong demand by workers for added protection against potential hazards...and there is little reason to believe that workers...given full information and mobility...demand hazard premiums equivalent in present value to the cost of mandated hazard controls.⁸

The Occupational Safety and Health Act...created an inflexible and inefficient mechanism for achieving its goals ...the act's framers chose to adopt the lofty but impractical goal of reducing injuries and illnesses to their technologically minimum level—ignoring cost considerations almost entirely.⁹

The dismal performance of OSHA is by no means an aberration. ... The risk regulation agencies share three principal shortcomings: 1) failure to consider the economic basis for intervention, with reliance instead on a risk-based criterion; 2) exclusion of cost-risk tradeoffs...and 3) reliance on rigid standards, which tend to be engineering controls.¹⁰

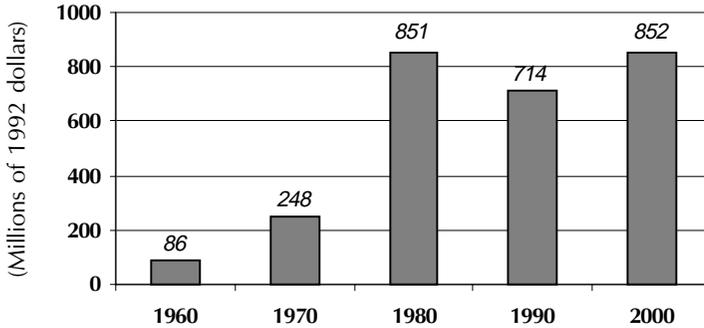
The other arguments for governmental intervention are similarly wanting. Governmental worker compensation programs have been largely privatized in many states because of problems with governmental operation. The widespread use of employer-sponsored health insurance makes it debatable whether separate worker compensation programs are necessary in any case. In unregulated insurance markets, insurance companies would inspect and review workplace safety as a component of insurance contracts.

Trends in Occupational Safety and Health

The 1970s was the watershed decade for regulatory activity, with the creation of OSHA as well as rapid increases in spending for mine safety, wages and hours standards, and the Office of the American Workplace. The legislation creating OSHA was passed in December 1970 (in the preceding year, a massive expansion of coal-mining regulation was approved). While a leading priority of organized labor, the OSHA legislation in fact had strong bipartisan support.

Figure 1

**Annual Real Regulatory Spending on Worker Safety,
1960-2000**



Source: Melinda Warren and Murray Weidenbaum, *The Rise of Regulation Continues: An Analysis of the Budget for the Year 2000* (St. Louis: Center for the Study of American Business, 1999), p. 11.

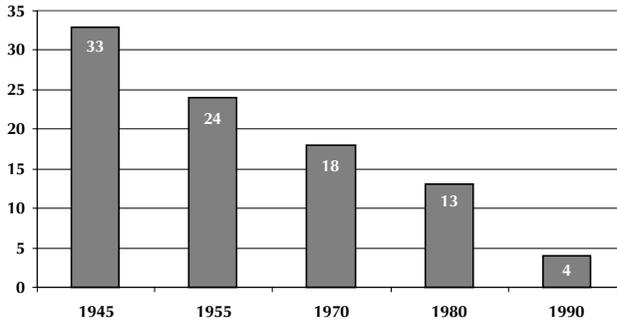
While Republicans worked to weaken the law (e.g., opposing provisions allowing the Secretary of Labor to close plants without a hearing), the final bill passed by a vote of 308 to 60 in the House of Representatives and was signed by President Richard Nixon.

Figure 1 shows that in inflation-adjusted terms, annual spending by federal regulatory agencies on job safety and other working conditions rose significantly in the 1960s, but even in 1970 it was less than one-third the level of a decade later.¹¹ Indeed, in inflation-adjusted terms, real regulatory spending fell somewhat during the Reagan administration of the 1980s, only to rise again to near its previous peak in the Bush-Clinton years. The estimate for 2000 is virtually identical to the 1980 figure. However, the data were converted to dollars of constant purchasing power using the Consumer Price Index for All Urban Consumers. There is a consensus among economists that the CPI overstates inflation; using an adjusted CPI that more accurately measures inflation would show that the 2000 figure is in fact greater than that for 1980—spending on worker safety regulations is at an all-time high.¹²

The figure above uses a broad definition of “job safety and working conditions.” Confining the analysis to OSHA does not change the trends in regulatory spending much. That agency did not exist in either fiscal year 1960 or 1970, reached its present size within a few years of inception, and is about the same size today as in 1980.¹³ In very recent years, regulatory spending has accelerated, with estimated outlays in 2000 for OSHA up almost 10 percent over fiscal year 1999.

Figure 2

**Annual Workplace Deaths per
Million Workers**



Source: United States Department of Commerce. Bureau of the Census, *Statistical Abstract of the United States, 1982-83* (Washington, D.C.: Government Printing Office, 1983), p. 412.

The creation of OSHA and the massive expansion of companion agencies such as the Mine Safety and Health Administration were prompted by concerns about job-related injuries and deaths. It was argued that American businesses were often unwilling to incur costs that would increase the safety of American workers. One claim, in an unpublished government-funded study—highly publicized but never substantiated—was that of every 10 occupational injuries, on average only one was reported.¹⁴

Figure 2 shows the trend in workplace related deaths during the postwar era. From 1945 to 1970, deaths per 100,000 workers declined by nearly one-half. While the decline has continued in the regulatory era since 1970, the rate of absolute annual decline (0.60 deaths per million workers) in the period 1945-70 is greater than in the post-regulatory era 1970-96 (0.54 deaths per million workers).¹⁵ Using that criteria, it is not clear that regulatory expansion had any positive impact on the reduction in death rates in the American workplace. Similar trends are observed for occupational injuries as well.

Moreover, the evidence above is highly biased in favor of overstating the decline in death rates in the post-regulatory era. The data above for 1945-80 are from the National Safety Council (NSC), while the 1996 data are from the Bureau of Labor Statistics (BLS), U.S. Department of Labor.¹⁶ The NSC abandoned its own data collection in favor of the BLS data in the mid-1990s. The NSC estimates were typically nearly double that of the BLS. This suggests,

at least with respect to deaths, that regulation has probably had little or no positive impact on the intertemporal decline in workplace death rates, with the trend actually reflecting the impact of technology and related factors discussed in greater detail below.

The incidence of injuries and illnesses severe enough to involve lost workdays was 3.4 per 100 full-time equivalent workers in 1973, when OSHA was in its infancy, and 3.3 in 1997—inconsequentially lower.¹⁷ If these data are correct, the post-OSHA era may have brought a near halt to the improvements in worker safety. Counting very minor injuries—those that did not require even one day off work—the post-1973 trend is still clearly downward (a 36 percent decline since 1973). Incidentally, there has been a sharp increase in the percentage of accidents leading to at least one day off work (from 31 to 46 percent) since 1973, which could be viewed as a sign of regulatory failure (the typical accident today is more serious than a generation ago), but more likely reflects a general trend in American society to take advantage of generous provisions for temporary or permanent disability.¹⁸

Summing up the historical evidence, the trends seem to suggest that, in the absence of OSHA and similar agencies, workplace safety today would probably be similar to what is actually observed.

Philip Howard recounts one reason occupational safety has not improved, as suggested by Ron Smeal, manager of a Pennsylvania brick factory: “The changes that really irk Smeal are the ones forcing workers to change habits that have been successful and accident-free. ‘Doing it a new way after years of doing it the old way,’ Smeal notes, ‘is just an invitation for an accident.’”¹⁹ As F.A. Hayek has observed, much human economic interaction is dictated by tacit knowledge not known or understood by government planners or regulators.²⁰ Aaron Wildavsky concludes “The harm to health from safety measures may outweigh the help.”²¹

Summing up the historical evidence, the trends seem to suggest that, in the absence of OSHA and similar agencies, workplace safety today would probably be similar to what is actually observed. The benefits of regulation, if any, are comparatively small. However, the costs are considerable. The actual budget of OSHA and

related agencies is small in comparison to the business costs of *complying* with regulations. One careful study estimates the compliance costs of OSHA to be about \$33 billion per year.²²

Technological Change and a Safer Workplace: A Macro Perspective

America's real output increased more than five-fold from 1920 to 1970, with output growing about 2.5 times on a per capita basis.²³ The rate of economic growth in the post-OSHA era is by some measures actually slightly lower than from 1920-70, although real output per capita in 1998 was still 68.6 percent above the 1970 level.²⁴

Economic growth brings *qualitative* improvements in virtually all economic activities, improvements resulting from technological advances—new ways of combining inputs. In his exhaustive study of the half-century that preceded OSHA, Edward Denison²⁵ concluded that nearly half of total output growth was productivity-induced, largely resulting from technological change, and over three-fourths of the rise in output *per employee* was attributable to this factor.

Economic growth means rising incomes, and that means changing tastes. It turns out that the demand for services tends to be highly income-elastic, while the demand for goods is on average less so. As incomes rise by 100 percent, the average family increases its spending on food (a good) by far less, say 40 percent. Yet it increases its spending on tourism and education (services) by more than 100 percent. Service activities on average have lower risks of accidents and deaths than goods-producing activities. Also, with economic growth comes an increase in leisure. The average hours that a worker puts in on the job have fallen significantly over time, both as a consequence of a decline in the work week, and because of the increased availability of paid holidays, vacation, and sick leave. Today's workers are far more rested. Higher incomes have led to lower labor force participation from the very young and the very old, groups prone to accidents.

As incomes rise, people feel they can afford to avoid risks more, hence they save more and avoid risky jobs. The "compensating differentials" rise for risky work, providing added impetus for inventions that substitute machines for labor. Thus technology leads the economy to be more *safety-intensive*. In the 1960s in automobile plants, virtually all painting was done in shops with high levels of fumes. Two decades later, that painting was largely done by industrial robots, dramatically lowering risks of occupational illness or disease.

Even in the era before extensive government regulation, com-

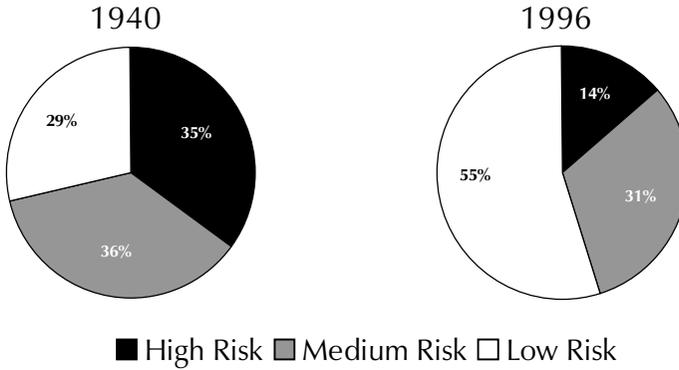
panies had a strong interest in reducing the number of injuries or deaths. Aside from humanitarian concerns over the loss or maiming of colleagues, companies with high injury or death rates faced high worker compensation payments and the possibility of lawsuits, not to mention the disruption of production associated with the temporary or permanent loss of experienced employees. There is undeniable statistical evidence that at least part of the improved safety in the workplace is due to the changing nature of work, a factor that reflects technological advance, capital formation, and changing tastes. To get some feel for the extent of change, I examined eight broad occupational categories of the U.S. Department of Labor: agriculture, mining and quarrying, construction, manufacturing, transport and utilities, trade, services, and government. Four of these categories are “high risk” occupations: agriculture, mining, construction, and transportation. Death rates per 100,000 workers were at least four times the average for all workers in 1996.²⁶ In two “medium risk” categories, manufacturing and government, the death rates in 1996 were slightly below the average for all occupations. The remaining two “low risk” categories, trade (both wholesale and retail), and services (including financial services), had extremely low rates of occupational mortality, one-half or less than the overall average for all occupations.

There is undeniable statistical evidence that at least part of the improved safety in the workplace is due to the changing nature of work, a factor that reflects technological advance, capital formation, and changing tastes.

Figure 3 shows how, over time, jobs have moved dramatically away from the high-risk occupations toward those with moderate to low risk. Whereas in 1940 there were more high-risk jobs than low-risk ones, by 1996 the low-risk jobs were about four times as numerous as the occupations where the probability of death was relatively high. The most dangerous jobs were in agriculture and mining and quarrying, occupations that saw dramatic declines in relative importance over time with technological changes that led to dramatic increases in labor productivity (especially agriculture), or to the substitution of new products (e.g., natural gas and electricity for coal) that were safer to produce.

Figure 3

**Percentage of Workers in Different Risk Jobs,
1940-1996**



Source: Aaron Wildavsky, *Searching for Safety* (New Brunswick, N.J.: Transaction Publishers, 1988).

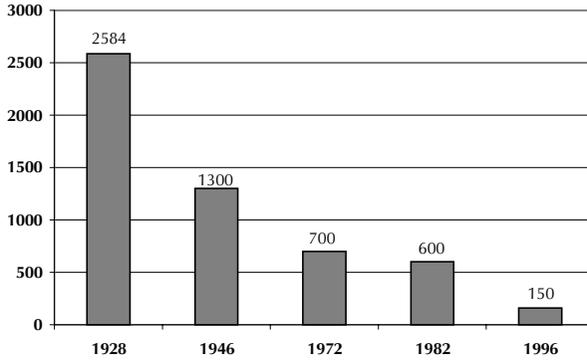
The rise in the proportion of low-risk jobs in the services sector actually accelerated after 1970: from 1940 to 1970, the proportion of low-risk jobs increased from 29 to 40 percent (or 0.37 percentage points per year), while from 1970 to 1996, that proportion rose from 40 to 55 percent (or 0.58 percentage points per year). One reason to believe OSHA and related agencies probably have not had a meaningful positive impact on occupational health and safety problems is that the high cost of complying with the regulations of these agencies is a drag on economic growth, and economic growth itself promotes workplace safety.²⁷ Whatever modest gains to safety have come from specific OSHA rules have probably been offset by the drag associated with compliance costs that approach, if James's estimates are accurate, about 0.5 percent of annual total output.

**Technology and Worker Safety:
A Case Study of Mining**

The emphasis on the broader effects of technology-driven economic growth on worker safety fails to capture specific examples of how technology works in individual industries. Consider the coal mining industry.

In 1928, mining accidents took the lives of 2,584 workers.²⁸ Good data from the early years are limited, but by all indications the 1928 figure was typical for the first decades of the 20th cen-

Figure 4
Deaths in American Mining,
1928-1996



Sources: National Safety Council and Bureau of Labor Statistics.

ture. For example, from 1900 to 1914, there were five coal mining disasters in which over 200 lives were lost.²⁹ Coal mining was perhaps the most dangerous major occupation in the nation, and a large percentage of miners suffered accidents or, worse, death, during their work tenure. As Figure 4 shows, the number of mining deaths has dramatically declined over time—most of that decline achieved before heavy federal regulation.

In the first decade of intense regulation, the 1970s, mining deaths declined only modestly, though the rate of decline has increased somewhat in the past 15 years.

External Technological Factors

The mining industry demonstrates how technological change saves lives. The changes are both *internal* to the industry and *external*. Turning first to the external, it is useful to review how the most important mined commodity, coal, was used in the 1930s, for example. In those years, there were four large classes of customers: railroads, steel mills, electric utilities, and private households and businesses. Railroads used massive quantities of coal to fuel steam engines; steel mills used coal to smelt iron; utilities used coal to run turbines; and households and businesses used coal to heat their homes and work sites.

In the 1930s, the diesel engine was introduced into railway transportation. It saved both materials and labor, ending the need for coal and water, and, more importantly, eliminating the need for

a fireman on locomotives. By the mid-1950s, steam engines were largely gone in the United States, and with that came a significant decline in the demand for coal. A secondary set of technological factors relates to the increased substitution of alternative forms of transportation, most spectacularly the rise of the automobile and airlines as viable long-term transportation modes, leading to the sharp decline in passenger train travel. These changes led to a declining number of accidents in both the mining and railroad industries.

Turning to household uses of coal, the daily removal of coal clinkers from furnaces is something only older Americans can remember. Between 1945 and 1970, a large proportion of coal-heated American homes switched to alternative fuels, and virtually no new homes were built with coal heating. Natural gas, oil, and electricity were cleaner and far less labor intensive. Invention—new ways of extracting gas and oil (including off-shore exploration)—was combined with discovering new oil and gas fields. Thus technology not only reduced industrial accidents, but also pollution as well.

In the other two traditional major uses of coal, substitution away from the material has been less pronounced, but still noticeable. Although they continue to rely heavily on coal, electric utilities have sought alternative fuel sources, including hydroelectric, nuclear, and petroleum derivatives, and even solar power, to a minor extent. While the steel industry continues to use coal, the development of a host of new materials has led to a significant decline in steel's share of the materials market. Aluminum and new plastic products derived from petrochemicals increasingly replaced steel in everything from beverage cans to automobiles.

With all of this technologically-induced substitution away from coal-based products, the production of bituminous coal has remained remarkably constant, despite the enormous growth in real total output and population. Coal production in 1996 was only marginally higher than in 1918.³⁰ Although the income elasticity of demand for energy products is positive (richer people consume more energy), technologically-based substitution has led to a sharp decline in the market share of a product that is relatively dangerous to extract and to an increase in safer alternatives. Even today, coal mining is considerably more dangerous than extraction of other energy sources. In 1996, the incidence rates of occupational injury and illness in coal mining were 60 percent higher than in oil and gas extraction.³¹

Over time, as economic growth occurred, worker pay was closely tied to the added revenues associated with each incremental worker. As pay rose with productivity, workers became more valuable—and the loss of them became more costly. The absolute compensating wage differential necessary to induce workers into

dangerous occupations grew, increasing the incentives for businesses to innovate in such a way that reduced these higher labor costs, which was partly achieved by finding substitute materials whose extraction was less risky (and thus costly) to run turbines, heat homes, and so on.

Internal Technological Factors

Coal production is at an all-time high (albeit only slightly higher than decades ago), while coal mining deaths have fallen more than 90 percent from the levels prevailing early in the 20th century. A large part of the improved trend in safety has come from technological improvements specific to coal mining.

In the 1920s, mining was done in significant part by hand, with miners using picks and shovels to extract coal almost exclusively from underground seams. In the 1990s, most coal was mined from open pits, ending the problem of deadly methane gas build-up that can kill and cause horrendous explosions. Even in underground mining, continuous extraction machines have dramatically reduced the dependence on subterranean labor. In the late 1920s, nearly 1 million coal miners mined about 500 tons per worker. Today, fewer than 100,000 workers mine well over 6,500 tons per worker—a 13-fold increase in labor productivity. Capital-labor substitution embodying improved technology has taken large numbers of miners out of harm's way.

Technology and the Possibilities for Private Regulation

Technology has made the workplace safer, both through the general effects of economic growth and through specific innovations in worker safety. But technology has weakened the traditional argument for governmental regulation in another way, namely the imperfect and costly nature of safety information. Within minutes, one is able to download voluminous statistics on workplace safety for specific industries, a chore that a few years ago would have taken the average citizen days or weeks. The costs of labor market information are sharply declining. E-mail has led to a resurgence in interpersonal correspondence, invigorating the informal labor market information networks that have always been important in job decisions. Other technologies, from teleconferencing to fax machines, have similarly contributed to providing a more informed labor force.

Moreover, there are market-based, non-governmental “regulatory” solutions available that are provided by private third parties, either for-profit or non-profit enterprises.³² A company that uses electric tools that is concerned about electric shocks to its

workers will insist that the tools be approved by Underwriters Laboratories (UL), an organization that employs more than 5,200 and certifies nearly 90,000 products annually. Founded in 1894, UL has inspection centers in 74 countries in addition to five large testing laboratories in the United States. Each year, more than 14 billion UL marks are applied to products worldwide.

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At least a dozen other smaller organizations (e.g., Intertek Testing Services, Entela, Inc., Electro-Test, Inc., Factory Mutual Research) compete for the business of certifying that firms meet standards regarding products produced or used in the workplace. In the interest of transparency, certification reports are sometimes posted on the Internet. For example, ATS Products, a California manufacturer of fume and smoke exhaust systems, recently sought safety certification of its products from Factory Mutual Research (FMR), a Massachusetts-based testing company. In its October 22, 1998 report (revised on November 11, 1998), FMR recounted how it performed an ignition test, two fire propagation tests, and three combustion tests on specimens whose production in the ATS Products California facility was witnessed by FMR personnel.³³ Any company buying ATS goods for use in their workplace can readily verify FMR’s positive certification given ATS’s decision to post it on the Internet.

Professional associations like the American Dental Association (ADA) often rate products used by their members, not only with regard to effectiveness for consumers, but also for safety issues regarding employees. The ADA employs over 100 consultants as well as its own scientific staff. Professional associations provide an element of trust that makes those impacted feel they are getting accurate, unbiased information. There are many opportunities for trustworthy regulation to be provided by private means.³⁴

Internationally, firms seek quality assurance by requiring suppliers to become registered to the ISO 9000 and ISO 9001 standards. These standards are largely related to product quality, but can easily be adapted to include safety criteria. Insurance companies that provide health or liability insurance for employers offer premium discounts for especially safe work practices, a form of experience rating

that provides incentives for businesses to practice economically efficient safe practices. In short, the private market economy contains all sorts of mechanisms to promote safety in the workplace.

As Yilmaz points out, private regulation has several positive attributes.³⁵ First, it tends to be effective. While compliance is voluntary, failure to adhere to standards can mean a huge loss in business (such as would happen if a company lost UL approval for its product). Second, enforcement tends to be strong as well, as parties sign contracts providing for sanctions, fines, product recalls, and even public announcements of violation of standards. Third, private regulators can and do operate in a flexible, responsive manner, closely following technological changes occurring at the industry level. The less formal, less adversarial relationship actually allows for faster revision of certification standards. Finally, private regulation tends to be much cheaper. The firm does not face one-size-fits-all global mandates, but rather regulations related to their specific circumstances. The private regulators must compete for business, so they must be conscious of costs, all of which are passed on to the firm being voluntarily regulated.

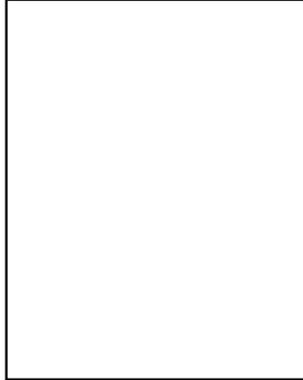
Conclusion

The evidence suggests that occupational safety and health were improving markedly in the era before vigorous federal regulation, reflecting in large part the impact that technology and market forces had in shifting resources away from dangerous forms of employment and bringing about improvements within those risky occupations. In the era of heavy regulation, the workplace has continued to become somewhat safer, although the rate of improvement in safety is at best the same as it was in the pre-regulatory era, and perhaps a good deal less. Structural changes in the economy, many of them at least partly technology-based, have led to increased importance of comparatively safe jobs in the service industries. Moreover, since technological change seems to be oriented towards promoting workplace safety, it would be predicted that the workplace would continue to get safer in the absence of regulation, assuming technological progress continues as it has for over two centuries. Falling information costs arising from new technologies (e.g., the Internet) weaken the traditional case for government intervention. Private firms have developed a brisk business in helping companies meet standards of safety, and still others are providing important information through their certification of firm safety standards.

Endnotes

1. This is somewhat ironic, since advocates of federal regulation around the time of OSHA's creation argued that technological change increased the need for regulation. For example, see Nicholas A. Ashford, *Crisis in the Workplace: Occupational Disease and Injury*, Cambridge, Mass.: MIT Press, 1976, especially p. 4.
2. Elliott, Robert and Robert Sandy, "Illness and Wages: The Impact of Occupationally-Related Illness on Earnings." Paper presented at the annual meeting of the Allied Social Science Associations, New York, 1999.
3. Kniesner, Thomas J. and John D. Leeth, "Improving Workplace Safety." *Regulation* 14 (fall 1991): 64-70.
4. Viscusi, W. Kip, *Risk By Choice: Regulating Health and Safety in the Workplace*. Cambridge, Mass.: Harvard University Press, 1983, p. 59.
5. For more detailed arguments for regulation, see Robert S. Smith, "Protecting Workers' Health and Safety" in *Instead of Regulation: Alternatives to Federal Regulatory Agencies*, edited by Robert W. Poole, Jr. Lexington, Mass.: Lexington Books, 1982, pp. 332-337, or Viscusi, especially chapters 4-5.
6. Rees, Albert, "Information Networks in Labor Markets." *American Economic Review* 56, no. 2 (May 1966): 559-566.
7. For a discussion of OSHA's administrative procedures and some rules it has implemented, see Ashford, especially p. 4.
8. Northrup, Herbert R., Richard L. Rowan, and Charles R. Perry, *The Impact of OSHA*. Philadelphia, Penn.: Industrial Research Unit, Wharton School, University of Pennsylvania, 1978, 537-38.
9. Smith, 334-5.
10. Viscusi, 136.
11. Warren and Weidenbaum, 1999, p. 11.
12. Boskin, Michael J., Ellen R. Dulberger, Robert J. Gordon, Zvi Griliches, and Dale W. Jorgenson, "Consumer Prices, the Consumer Price Index, and the Cost of Living." *Journal of Economic Perspectives* 12 (winter 1998): 3-26.
13. Warren and Weidenbaum, 1999, p. 11.
14. Halloran, Richard, "Study Disputes U.S. Report on Industry Accidents." *New York Times*, 21 September 1970, 22.
15. United States Department of Commerce. Bureau of the Census. *Statistical Abstract of the United States, 1982-83*. Washington, D.C.: Government Printing Office, 1983, 412; *Statistical Abstract of the United States, 1998*, Washington, D.C.: Government Printing Office, 1998, 441.
16. The BLS has collected good data on workplace injuries since the 1920s, but deferred to the National Safety Council on death data until recent years.
17. United States Department of Labor, Bureau of Labor Statistics, Table 6, "Incidence Rates of Occupational Injuries and Illnesses for Private Industry by Selected Case Types, 1973-98," at <http://stats.bls.gov/news.release/osh.t06.htm>.

18. Vedder, Richard K., "America the Disabled," *Wall Street Journal*, 4 September 1996, A10.
19. Howard, Philip K., *The Death of Common Sense: How Law is Suffocating America*, New York: Random House, 1994, 14.
20. Hayek, Friedrich A. "The Use of Knowledge in Society." *American Economic Review* 35 (September 1945), 519-30.
21. Wildavsky, Aaron, *Searching for Safety*, New Brunswick, N.J.: Transaction Publishers, 1988, 50.
22. James, Harvey S. Jr., "Estimating OSHA Compliance Costs." Policy Study No. 135, St. Louis: Center for the Study of American Business, Washington University, October 1996.
23. Vedder, Richard K., *The American Economy in Historical Perspective*, Belmont, Calif.: Wadsworth, 1976, 345.
24. United States Council of Economic Advisers, *Economic Report of the President*, Washington, D.C.: Government Printing Office, 1999, 328, 367; United States Department of Commerce, Bureau of Economic Analysis, Table 1.2, "Real Gross Domestic Product," at <http://www.bea.doc.gov/bea/dn/nipatbls/NIP1-2.HTM>.
25. Denison, Edward F., *Accounting for United States Economic Growth, 1929-1969*, Washington, D.C.: Brookings Institution, 1974.
26. *Statistical Abstract, 1998*, 443; United States Department of Labor, 1999.
27. Wildavsky.
28. National Safety Council, *Accident Facts*, Chicago: National Safety Council, 1931, 51.
29. National Safety Council, 21.
30. United States Department of Commerce, Bureau of the Census, *Historical Statistics of the United States, From Colonial Times to 1970*, Washington, D.C.: Government Printing Office, 1975, 589; *Statistical Abstract, 1998*, 699.
31. *Statistical Abstract, 1998*, 442.
32. This section draws extensively on the fine study by Yilmaz (Yesim Yilmaz, "Private Regulation: A Real Alternative for Regulatory Reform," Policy Analysis No. 301, Washington, D.C.: Cato Institute, 1998).
33. Factory Mutual Research Corporation, 1998, posted at <http://www.atsduct.com/prod/approvals/fmapproval4910.html>.
34. Klein, Daniel B., "Quality and Safety Assurance: The Division of Knowledge Does Apply to the Achieving of Trust," and "Trust for Hire: Voluntary Remedies for Quality and Safety," in *Assurance and Trust in a Great Society*, Irvington, N.Y.: Foundation for Economic Education (forthcoming).
35. Yilmaz, 9-10.



Richard K. Vedder is adjunct fellow with the Center for the Study of American Business at Washington University in St. Louis and Distinguished Professor of Economics at Ohio University. An economic historian specializing in labor issues, his research and commentaries have been published extensively in major media. In April he traveled to Russia to be part of a small group of economists from several nations that advised senior Russian officials, including President Vladimir Putin, on economic reforms needed in that country.

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