

tries was restricted. Prices for licensed services increased and earnings for practitioners became higher than for comparable occupations with similar levels of human capital investment and experience. For consumers who could afford licensed services, quality rose. One of the major controversies in the area of occupational regulation is whether such regulations in fact raise quality or simply restrict competition.

In most cases, the available empirical evidence shows that licensing causes a rise in prices, but its impact on the quality of services rendered is unclear (Cox and Foster 1990). For practitioners of the service, licensing leads to a rise in wages. For example, switching to a licensed occupation from an unregulated occupation raises wages 17 percent in comparison to switching to an unregulated occupation from a regulated one. On average, working in a regulated occupation raises the wage premium approximately 10 to 12 percent relative to similar unregulated occupations. This value is at the lower end of the range of the union wage impact in the United States. Working in the same occupation in a state that requires licensing raises wages 4 percent relative to an unregulated state. Statistical estimates of the costs of licensing show that this form of occupational regulation reduces output in the United States by less than one-tenth of 1 percent of total consumption expenditures annually. Some argue that this is a small price for the potentially enhanced quality that is generated by occupational regulation.

Regulation of occupations in the European Union focuses on restrictions following entry into an occupation to a greater extent than occurs in the United States (Garoupa 2004). In the European Union, occupational regulations generally limit prices and regulate the structure of organizations of licensed workers. Most occupational entry restrictions also regulate the number of individuals who are admitted to schools that train workers for the regulated specialty. The results from statistical estimates show that licensing has a smaller impact on earnings in the European Union than in the United States. Unlike the United States, nations such as Germany are deregulating many of their previously licensed occupations, suggesting that the practice of occupational regulation can be reversed in response to public pressure.

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OCCUPATIONAL SAFETY

Highly publicized job accidents, such as mining disasters, create the impression that occupational safety is a haphazard enterprise. Although accidents are random events, occupational safety levels are governed by a variety of social institutions and display systematic patterns across time and across different types of industry. Thus, the probability of occupational injuries and illnesses varies in a quite predictable manner even though the occurrence of particular accidents usually cannot be foreseen.

From the standpoint of economic analysis, firms provide specific safety levels by striking a balance between the costs to the firm of accidents and the costs of providing greater safety. The differences across industries in the costs of providing safety account for the higher risk levels of industries such as mining and construction, where eliminating risks is very costly, as compared to safer industries such as banking. Firms will incur these costs to promote safety if they have a financial incentive to do so. The chief sources of the financial incentives that lead firms to provide a safe workplace are wage premiums that they pay to workers on risky jobs, workers' compensation costs, and government health and safety regulations.

The economic analysis of occupational safety dates back to Adam Smith. Workers require higher pay, or compensating differentials, to be attracted to dangerous jobs. This wage premium usually is not in the form of hazard pay but rather is part of the higher overall pay package required to attract workers to risky jobs. In the United States, these wage premiums totaled \$229 billion in 2000, or about 5 percent of all worker wages. Studies have documented similar but lower wage premiums throughout the world in countries ranging from India and Taiwan to the United Kingdom.

A useful shorthand puts these wage premiums in perspective: Suppose that the average worker faces an annual occupational fatality risk of 1 in 20,000 and receives about \$350 for facing that risk. Put somewhat differently, if there were 20,000 workers facing a comparable risk, there would be one expected death in the group and \$7

million paid in wage compensation for risk. Thus, the total wage compensation per expected death is \$7 million, which economists often refer to as the value of statistical life (VSL). This \$7 million figure is the average VSL estimate based on U.S. studies.

Estimates of the VSL only pertain to the tradeoffs workers make between very small job risks and the wages they require to accept these risks. They do not imply that a worker would be willing to accept certain death for a payment of \$7 million, or that a worker would have the resources to pay that amount to avoid the certainty of a job-related death.

Although the incentives that wage premiums for risk provide are often substantial, market forces may not be adequate. Market incentives will fall short if inadequate knowledge of health and safety risks impedes worker decisions. Market incentives also do not capture society's broad altruistic concerns with worker health. Finally, wage premiums alone do not address the insurance needs of injured workers.

As a result, several modes of government intervention have been developed to address these shortcomings. Since the early twentieth century, states have instituted workers' compensation plans that compensate workers for accidents irrespective of where fault lies. The workers' compensation premiums that firms pay totaled \$32.9 billion in 2003. These costs create powerful incentives for safety, as firms with better safety records pay lower insurance premium rates. This linkage of premiums to accident-prevention performance is particularly strong for large firms. Statistical estimates indicate that worker fatality rates would be one-third higher than they are now in the absence of these safety incentives.

Beginning with the passage of the Occupational Safety and Health Act of 1970, there has been direct federal regulation of workplace safety in the United States. These regulations have largely taken the form of standards that either specify safe workplace technologies or set maximum limits on exposures to dangerous chemicals. In addition, there are also important informational requirements, such as standards governing the proper communication of hazards associated with various chemicals. Firms are subject to inspection to ascertain if they are meeting regulatory standards, and those firms out of compliance incur fines. The magnitude of these financial penalties has been modest but rising over time, with total fines in fiscal year 2002 equaling \$149 million. Most published studies indicate an effect on occupational injury rates on the order of a 2 to 4 percent reduction in the frequency of job injuries, but the increase in penalty levels since the 1990s may generate greater effects on safety.

The net effect of these different societal mechanisms to reduce risk has been a tremendous improvement in

occupational safety. The workplace fatality rate has declined steadily over the past century. The workplace fatality risk was ten times greater in 1928 than in 2003, and the 2003 figure represents a 25 percent decline over the preceding decade, though some of that improvement may be due to changes in data reporting practices.

Two contributors to this long-term improvement in safety are noteworthy. First, the rise in societal wealth has increased the value workers and society more generally place on risk reduction. This increased wealth boosts the wage premiums firms must pay to attract workers to risky jobs, thus leading firms to introduce safer workplace conditions to reduce these costs. Greater societal wealth also increases public support for government regulation, which tends to be less pronounced in less advanced economies. Second, technological improvements over time have led to the production of safer technologies and improvements in safety equipment. Consequently, the costs of promoting safety have also declined so that firms can strike a balance between the costs of safety improvements and the costs of a risky workplace that leads to lower risk levels.

These differences in wealth and technologies also contribute to differences in safety levels across countries. International differences in workplace safety levels and regulatory regimes are to be expected given differences in societal wealth. Less advanced countries also may lack access to modern, safer technologies. However, increased affluence and economic progress in these developing countries is likely to increase their safety levels over time.

SEE ALSO *Occupational Hazards; Occupational Regulation; Risk; Workplace Relations*

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OCCUPATIONAL SCORE INDEX (OCCSCORE)

The Occupational Score Index (OCCSCORE) is a measure of occupational reward that is available across decennial census datasets from 1850 to 2000. It was developed at the Minnesota Population Center as part of the