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Economic Foundations of the Current Regulatory Reform Efforts

W. Kip Viscusi

Traditional economic regulation focused on issues such as antitrust and setting prices for public utilities. But in the last few decades, the emerging role of environmental and risk regulation has transformed the role of regulation in the American economy. Rough estimates of the economic costs of government regulations exceed \$500 billion (Hopkins, 1992). This total can be divided up in various ways. More than half the cost is attributable to paperwork requirements arising out of regulation, but there is also more than \$200 billion in direct costs of regulation, including costs to business. More than half of this amount is due to environmental regulation, and much of the remainder is attributable to various forms of risk regulation. About \$100 billion involves government transfers, such as the effects of the minimum wage, while the rest involves costs paid by businesses. Regulatory benefits reduce the net burden of these efforts on society, but there are no good estimates of the total of regulatory benefits.

Regulatory interventions often have a sound economic foundation. Many economists would agree that markets have a difficult time spontaneously organizing to address all forms of environmental pollution and that consumers are unable to assess the risks associated with, say, prescription drugs. However, the existence of a rationale for some sort of government intervention in no way eliminates the need for obtaining the greatest benefit to society that can be derived from these regulatory expenditures.

During 1995 and 1996, the 104th Congress has considered a flurry of bills intended to foster more cost-effective regulatory policies by imposing greater

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structure on risk and environmental regulations.¹ These legislative efforts were quite broad in scope; it's fair to say that they attempted to revolutionize the criteria for approval of government regulations. For example, rather than cleaning up hazardous waste sites whenever hazardous chemicals are present, irrespective of the costs involved and whether any populations are actually exposed to the risk, the new legislative proposals were intended to require the Environmental Protection Agency (EPA) to assess the risks and to show that the social benefits of these actions exceeded the associated costs.

The need for economic balancing is inevitable in a world of constrained resources. Suppose that we were to devote the entire U.S. gross domestic product to the prevention of fatal accidents. Even then, we would be only able to spend \$55 million per fatality (Viscusi, 1992, p. 5). That expenditure would leave literally nothing for other goods, such as other risks or environmental pollution, let alone basics like food, housing and medical care. Unless mechanisms exist for placing bounds on our risk reduction efforts, we can end up pursuing policies of diminishing marginal impact and diverting resources from more productive uses.

A frequent approach of government regulations is to eliminate fatality risks that are one in a million annually or greater.² But risks of this magnitude are ubiquitous. Death risks of one in a million are incurred every time we have one chest x-ray, live two days in New York or Boston (air pollution), travel 10 miles by bicycle, eat 40 tablespoons of peanut butter (cancer from aflatoxin B) or drink Miami drinking water for one year.³ If agencies devote their efforts to eliminating trivial risks of this magnitude, they are likely to be missing opportunities for policies that could be of much greater benefit.

It is interesting to consider why current governmental efforts do not already put the design of regulations on a sounder footing. Why is a reform even needed to influence the guidelines for promulgating regulation? Why are agencies not more balanced? What can the possible objections be to legislation that would foster greater balance in the design of governmental regulatory efforts? Put somewhat differently, is the recent impetus for establishing economic criteria to assess regulations simply a disciplinary concern of economists or does it, in fact, have substantive implications for the design of regulatory policy? Surely, the spirited nature of the policy debate, the fact that no consensus regulatory reform bill has yet been passed by both houses of Congress, and the threat of a presidential veto tend to imply that issues of importance are at stake here.

This article will review the process by which legislative mandates give regulatory

¹ All subsequent discussion of House and Senate bills will refer to those introduced in the 104th Congress. In March 1995, the House of Representatives inserted the regulatory reform bill H.R. 1022 into another piece of legislation, H.R. 9, which was passed.

² The Food and Drug Administration (FDA) and EPA, for example, target lifetime risks of 1 in 100,000 which, over a 70-year assumed lifetime, are actually much smaller than 1 in a million. In the case of the EPA Superfund program, cleanup is mandatory for lifetime cancer risks in excess of 10^{-4} and discretionary for risks between 10^{-4} and 10^{-6} .

³ See Wilson (1979) for a more comprehensive tally of one in a million risks.

agencies the power to promulgate regulations. I will argue that regulatory reforms that place the assessment of regulation on sounder footing and incorporate unbiased risk assessment practices can potentially enhance the performance of regulatory policies.

Legislative Mandates

Congress does not typically promulgate government regulations, with a few rare exceptions. Instead, Congress establishes broad legislative guidelines for regulatory policy that define the objectives that should be promoted by regulations that will be issued by the various regulatory agencies within the executive branch. These regulatory agencies in turn propose regulations that go through a rule-making process in which there is both a review by the Office of Management and Budget (OMB) as well as a public comment period, after which the agency can issue the regulation. In some instances, there is the threat that Congress will cut back funding if certain undesirable regulations are enacted.

The primary check on reckless regulatory policymaking is that if a regulation fails to be consistent with the legislative mandate defined by Congress, it can be challenged in court. However, judicial challenges or other reviews cannot overturn the legislative mandate itself (unless the mandate is unconstitutional) regardless of how restrictive it is. The Clean Air Act, for example, specifically excludes the consideration of costs in EPA's setting of national ambient air quality standards. Similarly, in its regulation of prescription drugs, the Food and Drug Administration (FDA) must ascertain the safety and efficacy of these products, but there is no overall benefit-cost test that must be met either by the drugs themselves or by the drug approval process. Since many useful drugs apparently become available more quickly to patients in western Europe, concern has been expressed that the U.S. drug approval process may be too cumbersome and cautious.

The principal judicial battleground over the breadth or narrowness of legislative mandates has involved the regulations of the Occupational Safety and Health Administration (OSHA). The legislative mandate of that agency has a safety-oriented character that is typical of other risk and environmental agencies. In particular, the Occupational Safety and Health Act of 1970 mandates the agency "to assure so far as possible every man and woman in the Nation safe and healthful working conditions."⁴ Other language in the bill mandates that OSHA undertake actions to protect workers against health hazards as far as is "feasible." The agency has interpreted these mandates in a very aggressive fashion, claiming there is no obligation to show that there is any relation between the benefits derived from the policies and the cost. Put somewhat differently, any risk reduction is justified as long as it reduces risk, regardless of how costly or inefficient it may be.

⁴ Section 26 of the Occupational Safety and Health Act of 1970, 29 U.S.C. §651 (1976).

Not surprisingly, this agency interpretation has been the subject of several major court cases, which in turn have influenced other agencies' interpretation of their own legislative mandates. In a 1980 decision involving the OSHA benzene standard, the U.S. Supreme Court sidestepped the benefit-cost tradeoff issue but did assess OSHA's risk mandate. In particular, before promulgating a regulation, the Court ruled that OSHA was required to demonstrate that the standard would generate significant reductions in risk and that the standard would be "reasonably necessary or appropriate to provide safe and healthful employment." The Court concluded that promoting safety was not the same as eliminating all risks, however small: "But 'safe' is not the equivalent of 'risk-free.' A workplace can hardly be considered 'unsafe' unless it threatens the worker with significant risk of harm."⁵ The requirement to show that the risk reduction is "significant" is also intertwined with how the agency assesses the risk, which is one of the principal concerns of the regulatory reform bills.

In 1981, the U.S. Supreme Court considered the balancing issue with respect to the OSHA cotton dust regulation. One possible avenue for inserting economic tradeoff concerns would be to interpret the legislative requirements that OSHA regulations be "feasible" in terms of whether there is a sensible balance between the risks reduced and the money spent. However, the Court rejected this broader economic interpretation of feasibility and instead interpreted the agency's legislative mandate in terms of whether there is the technical possibility of compliance ("capable of being done") rather than meeting a benefit-cost test.⁶

However, a more recent decision of the U.S. Court of Appeals would open the door for potential use of a benefit-cost test. Although the act in no way requires a benefit-cost test, the court indicated that OSHA was not foreclosed from undertaking some kind of benefit-cost balancing in promulgating its regulations. Moreover, the Court went so far as to outline a new methodology of risk-risk analysis, which will be discussed below.⁷

These few cases aside, however, the courts have deferred to the agency's discretion in interpreting its legislative mandate. The pivotal court decision establishing this point was a 1984 case in which the Natural Resources Defense Council challenged EPA's introduction of the "bubble" policy, which would judge a firm's emissions from the standpoint of an artificial bubble around the plant rather than on a smokestack-by-smokestack basis. The bubble policy enables firms to select the most cost-effective emissions sources to control at a plant. The Supreme Court ruled that courts should permit agencies to interpret ambiguities in their legislative mandates reasonably.⁸ Armed with these court rulings, regulatory agencies have had considerable discretion.

⁵ See the decision of the U.S. Supreme Court in *Industrial Union Department, AFL-CIO v American Petroleum Institute*, 448 U.S. 607 (1980).

⁶ See the decision of the U.S. Supreme Court in *American Textile Manufacturer's Institute v Donovan*, 452 U.S. 490 (1981).

⁷ See *UAW v Occupational Safety & Health Administration* 938 F.2d 1310 (D.C. Circuit 1991).

⁸ See *Chevron USA Inc. v NRDC*, 467 U.S. 837 (1984).

Regulatory Oversight

Since the Ford administration, there has been a formal regulatory oversight mechanism to provide a check on ill-chosen regulation. The Office of Management and Budget has been responsible for this activity since the Reagan administration. These oversight groups have been responsible for implementing executive orders with respect to regulatory criteria. In the Carter administration, these criteria required that regulations be cost-effective and that the agency quantify the benefits and costs of the regulation.⁹ However, this effectiveness test did little to screen out inefficient regulations since truly dominant regulatory alternatives that were not selected could be identified in only a few cases. The more usual case is one in which the costs greatly exceeded the benefits by any usual economic measure, but there are no alternatives that provide exactly the same or more benefits at less cost.

Since the Reagan administration, regulations have also been required by executive order to show that the benefits of the regulation exceed the costs.¹⁰ The Clinton administration has continued this policy, but emphasizes that this comparison should also recognize that not all benefits can be quantified in monetary terms.¹¹ However, this benefit-cost test provision is applicable only if it does not conflict with the agency's legislative mandate. The risk and environmental agencies invariably interpret their legislative mandate as excluding a formal benefit-cost balancing, using the Supreme Court decision in the cotton dust case and related cases to bolster their position. The result has been that the regulatory oversight effort has been restricted to generating marginal improvements in regulations and eliminating some of the very worst regulations. However, some agencies continue to issue many regulations that economists would judge to be inefficient, while other agencies may not be doing enough. A reallocation of regulatory priorities would be beneficial.

Tables 1 and 2 summarize the cost per life saved (with normal life expectancy) of a variety of regulations. These estimates do not, however, include all regulatory benefits, only the mortality effects that are typically the primary justification for the regulation. Suppose we take as our reference point an implicit value of life of \$5 million as the cutoff for an efficient regulation. This value is midway in the range of labor market estimates of value of a statistical life, which cluster from \$3 million to \$7 million, and should be a reasonable estimate of society's willingness to pay to avert a statistical death (Viscusi, 1993). By this standard, Table 1 shows regulations that have, in fact, met a benefit-cost test, while Table 2 lists some that have not.

Most noteworthy is that all regulations in Tables 1 and 2 that were issued by

⁹ The Carter effort was defined by Executive Order 12044, March 23, 1978 (Carter, 1979). The principal precursor was the Ford Executive Order 11821, November 27, 1974 (Ford, 1974).

¹⁰ Executive Order 12291, February 17, 1981, was the pivotal action that led to the adoption of the benefit-cost approach (Reagan, 1982).

¹¹ The Clinton Executive Order No. 12866, issued September 30, 1993, broadened the definition of benefits to emphasize the nonmonetary character of many effects (Clinton, 1993).

Table 1

**The Cost of Risk-Reducing Regulations That Pass a Benefit-Cost Test
Per Life Saved**

<i>Regulation</i>	<i>Agency Year and Status</i>	<i>Initial Annual Risk</i>	<i>Annual Lives Saved</i>	<i>Cost Per Life Saved (Millions of 1984 \$)</i>
Unvented Space Heaters	CPSC 1980 F	2.7 in 10 ⁵	63.000	\$.10
Oil & Gas Well Service	OSHA 1983 P	1.1 in 10 ³	50.000	.10
Cabin Fire Protection	FAA 1985 F	6.5 in 10 ⁴	15.000	.20
Passive Restraints/Belts	NHTSA 1984 F	9.1 in 10 ⁵	1,850.000	.30
Underground Construction	OSHA 1989 F	1.6 in 10 ³	8.100	.30
Alcohol & Drug Control	FRA 1985 F	1.8 in 10 ⁶	4.200	.50
Servicing Wheel Rims	OSHA 1984 F	1.4 in 10 ⁵	2.300	.50
Seat Cushion Flammability	FAA 1984 F	1.6 in 10 ⁷	37.000	.60
Floor Emergency Lighting	FAA 1984 F	2.2 in 10 ⁴	5.000	.70
Crane Suspended Personnel Platform	OSHA 1988 F	1.8 in 10 ³	5.000	1.20
Concrete & Masonry Construction	OSHA 1988 F	1.4 in 10 ⁵	6.500	1.40
Hazard Communication	OSHA 1983 F	4.0 in 10 ⁵	200.000	1.80
Benzene/Fugitive Emissions	EPA 1984 F	2.1 in 10 ⁵	0.310	2.80

Notes: "Initial Annual Risk" indicates annual deaths per exposed population; an exposed population of 10³ is 1,000, 10⁴ is 10,000, etc. In "Agency Year and Status" column, *P*, *R* and *F* represent proposed, rejected and final rule, respectively.

Sources: W. Kip Viscusi (1992), *Fatal Tradeoffs: Public and Private Responsibilities for Risk*. New York, Oxford University Press. The table is also based on information presented in John F. Morrall, III (1986), "A Review of the Record," *Regulation*, 10:2, p. 30. These statistics were updated by John F. Morrall, III, via unpublished communication with the author, July 10, 1990.

the U.S. Department of Transportation, whether as part of the Federal Aviation Administration (FAA) or the National Highway and Traffic Safety Administration (NHTSA), would pass a benefit-cost test. This strong policy performance is not an aberration. The U.S. Department of Transportation is one of the exceptional agencies that does, in fact, apply benefit-cost analysis in its regulatory efforts. The agency has recently employed an implicit value of life figure just under \$3 million, which is at the low end of the value of life spectrum, and it refuses to issue any regulations

Table 2

The Cost of Risk-Reducing Regulations That Fail a Benefit-Cost Test

<i>Regulation</i>	<i>Agency Year and Status</i>	<i>Initial Annual Risk</i>	<i>Annual Lives Saved</i>	<i>Cost Per Life Saved (Millions of 1984 \$)</i>
Grain Dust	OSHA 1987 F	2.1 in 10 ⁴	4.000	5.30
Radionuclides/Uranium Mines	EPA 1984 F	1.4 in 10 ⁴	1.100	6.90
Benzene	OSHA 1987 F	8.8 in 10 ⁴	3.800	17.10
Arsenic/Glass Plant	EPA 1986 F	8.0 in 10 ⁴	0.110	19.20
Ethylene Oxide	OSHA 1984 F	4.4 in 10 ⁵	2.800	25.60
Arsenic/Copper Smelter	EPA 1986 F	9.0 in 10 ⁴	0.060	26.50
Uranium Mill Tailings Inactive	EPA 1983 F	4.3 in 10 ⁴	2.100	27.60
Uranium Mill Tailings Active	EPA 1983 F	4.3 in 10 ⁴	2.100	53.00
Asbestos	OSHA 1986 F	6.7 in 10 ⁵	74.700	89.30
Asbestos	EPA 1989 F	2.9 in 10 ⁵	10.000	104.20
Arsenic/Glass Manufacturing	EPA 1986 R	3.8 in 10 ⁵	0.250	142.00
Benzene/Storage	EPA 1984 R	6.0 in 10 ⁷	0.043	202.00
Radionuclides/DOE Facilities	EPA 1984 R	4.3 in 10 ⁶	0.001	210.00
Radionuclides/Elem. Phosphorous	EPA 1984 R	1.4 in 10 ⁵	0.046	270.00
Benzene/Ethylbenzenol Styrene	EPA 1984 R	2.0 in 10 ⁶	0.006	483.00
Arsenic/Low-Arsenic Copper	EPA 1986 R	2.6 in 10 ⁴	0.090	764.00
Benzene/Maleic Anhydride	EPA 1984 R	1.1 in 10 ⁶	0.029	820.00
Land Disposal	EPA 1988 F	2.3 in 10 ⁸	2.520	3,500.00
EDB	OSHA 1989 R	2.5 in 10 ⁴	0.002	15,600.00
Formaldehyde	OSHA 1987 F	6.8 in 10 ⁷	0.010	72,000.00

Notes: "Initial Annual Risk" indicates annual deaths per exposed population; an exposed population of 10³ is 1,000, 10⁴ is 10,000, etc. In "Agency Year and Status" column, *P*, *R* and *F* represent proposed, rejected and final rule, respectively.

Sources: W. Kip Viscusi (1992), *Fatal Tradeoffs: Public and Private Responsibilities for Risk*. New York, Oxford University Press. The table is also based on information presented in John F. Morrall, III (1986), "A Review of the Record," *Regulation*, 10:2, p. 30. These statistics were updated by John F. Morrall, III, via unpublished communication with the author, July 10, 1990.

that cost more than that amount for a statistical life saved. Another transportation-related regulation by the Federal Railroad Administration (FRA) also is quite effective in saving lives, with a cost per life saved of \$500,000 for alcohol and drug control efforts.

In contrast, the regulations listed in Table 2 would fail a benefit-cost test. Clearly, some agencies like the EPA and OSHA are heavily represented among the regulations that fail such a test most severely. The difference across agencies highlights an opportunity to promote health and safety. If we could expand the safety-related efforts of the U.S. Department of Transportation and utilize the funds that would have otherwise been spent on very inefficient job safety and environmental regulations, we would save many more lives at less cost.

Perhaps the most striking aspect of Table 2 is the limited role that has been played by the OMB oversight effort. No regulation with a cost per life saved of under \$142 million per life has ever been rejected by OMB as part of the oversight effort (indicated by *R* in the second column). Remember, agencies can override OMB objections by appealing to the absolute character of their legislative mandate. In addition, many regulatory efforts are not subject to OMB review. The OMB regulatory review process only pertains to new regulations issued by regulatory agencies; as a result, regulations on the books for many years are exempt from review. In other cases, such as the EPA Superfund program, the agency implements regulatory guidelines that are broadly specified in legislation without specifically issuing new regulatory policies. This Superfund program, which is devoted to the cleanup of hazardous waste, prevents expected cases of cancer at a median cost of \$3.6 billion dollars per expected case (Viscusi and Hamilton, 1996), making it one of the least cost-effective government efforts. The OMB regulatory oversight unit has no leverage over governmental policies such as this in which no new regulatory policies are formally promulgated.

Regulatory Reform Legislation: An Overview

A variety of legislative changes have been proposed to remedy these deficiencies and to put risk regulations on sounder statistical footing, including both omnibus bills that would pertain to regulation generally and bills dealing with specific areas of regulation.¹² The political economy of these efforts to make regulations more efficient is often complex. Business interests presumably benefit from more regulatory restraint. However, corporate interests in less regulation are not always socially desirable. The beneficiaries of regulation also have mixed interests. Not all workers are made better because of excessively stringent job safety regulations.

¹² For examples of omnibus bills, see H.R. 1022 (passed as part of H.R. 9), H.R. 690, H.R. 1923, and S. 343. For examples of particular bills, see H.R. 1028, which pertains to Superfund, and S. 333, which deals with energy risk management.

Workers who lose their jobs because of inefficient regulations gain from reforms, as do average consumers. The most clear-cut political economy linkage was the prominent role of regulatory reform in Representative Gingrich's Contract with America.

These bills differ along a number of dimensions. Most focus exclusively on risk and environmental regulations; others also seek to reform more traditional rate regulation. The various regulatory reform bills have included a differing but wide range of provisions that would increase the requirements placed on the regulatory bodies. In some cases, regulatory agencies would be required to undertake retrospective analyses of existing regulations to determine their merits, whereas in others the emphasis is only on new regulations. Some bills would also require that agencies assess comparative risks for different regulatory policies, establish peer review panels to evaluate the scientific evidence underlying the regulatory proposal and create a formal recognition of the potential for judicial review of the regulatory proposal to assess whether the economic merits of the regulation do in fact meet the required test of benefits being in excess of the costs. These various institutional requirements do not introduce new economic tests that must be met by regulation, but nevertheless may have a strong impact on the structure of regulations and the speed with which regulations can be adopted. The transactions costs of issuing regulations are likely to soar under some of the proposals, particularly those that provide for judicial tests of economic analyses. This section will focus on the differences and issues that are of greatest interest to economists: benefit-cost analysis, performance vs. specification standards, the theories of risk-risk analysis, and the science and bias of risk assessment.

Benefit-Cost Analysis

From the standpoint of many economists, the centerpiece of the proposals for regulatory reform is the requirement that benefits of the regulation exceed the costs. In its most sweeping form, the requirement for passing a benefit-cost test would become a super-mandate, which overrides any possibly conflicting legislative guidelines.¹³ Without such a super-mandate provision, the reform bills would be of little more than symbolic value, for the various reasons discussed earlier. But even if there were broad agreement on a super-mandate, exactly how this benefit-cost test is specified would be controversial. Under restrictive versions of the legislation, benefits are required to exceed costs before a regulation can be issued. These restrictive approaches may also exclude benefits that are judged to be speculative, thus limiting the potential range of commodities valued. More open-ended variants of the legislation would require that benefits bear a "reasonable relationship to costs" or some similarly structured language that falls short of a rigid benefit-cost test.

¹³ One example of a bill in which there is an exemption for conflicting legislative provisions is S. 343. H.R. 1022 would override current legislative mandates.

If all consequences of policies could be readily monetized, this distinction would not be consequential. However, many outcomes have nonmonetary consequences for which attaching dollar values remains quite controversial. For example, how might one measure the benefits of affirmative action requirements or improved access for the handicapped? Many of the most controversial issues of valuation involve the environment: what, for example, is the value to society of an endangered species? This value is almost entirely a passive use or nonuse value. Quantifying the passive use value of an endangered species might require contingent valuation survey techniques to elicit society's willingness to pay for preserving these species, but this approach is extremely controversial.¹⁴ Since no market currently exists for society's value of endangered species, even conceptualizing how an individual might express such a valuation or think about this valuation process within the context of his or her current resource allocations raises considerable difficulties. Indeed, the debate over valuing passive use of environmental and natural resource outcomes is so fierce that there were even congressional proposals in 1995 to prevent agencies from considering such values on the grounds that they are too speculative.

The fact that many environmental outcomes cannot be readily monetized does not necessarily imply that they should be ignored. However, once the benefit-cost test becomes amended with language to encompass outcomes that cannot be readily monetized, the benefit-cost requirement may lose some of its appeal. But even an outcome that required a fuzzier benefit-cost test, without trying to monetize all benefits, would nevertheless represent a substantial departure from the current approach in which agencies have little accountability with respect to balancing at all because of their narrow interpretation of their legislative mandates.

Another possibility is to have legislation that permits agencies to consider benefit-cost balancing, but not to require that they show that benefits are in excess of the costs. In this instance, the regulatory oversight group at OMB might be able to use this structure to monitor regulatory agency actions and promote more balanced policies without imposing a formal benefit-cost requirement.

Performance vs. Specification Standards

An economic corollary to the desirability of a benefit-cost test is that companies should have the flexibility to adopt the least cost means of meeting the risk reduction objective specified in the regulation, such as the bubble policy. A performance standard would give companies such leeway, whereas a specification standard would mandate specific compliance technologies, such as a particular type of guard for machinery.

A relatively large-scale experiment with the performance approach has taken place with respect to EPA emissions regulations. The most ambitious of these

¹⁴ See, for example, the symposium on contingent valuation in the Fall 1994 issue of this journal, with papers by Portney, Hanemann, and Diamond and Hausman. See also Carson et al. (1994).

efforts, in effect, establishes a market for pollution using tradable pollution permits. Carlin (1992) has estimated that the more recent tradable permit system saves about \$1 billion annually in pollution control costs by shifting the burden of pollution to sources where pollution can be reduced most cheaply.

Some of the regulatory reform bills included provisions to promote a performance-oriented rather than a technology-forcing approach.¹⁵ These efforts have broad support among economists but are subject to two principal objections. First, agencies may be better able to monitor compliance with technology-forcing standards. In many instances, however, such as the OSHA grain dust standard, it has been possible to incorporate flexibility with a standard that can be monitored. Second, flexible standards may have political repercussions (Crandall, 1983). If companies could meet air pollution requirements by shifting to low sulphur coal from the American west rather than installing scrubbers, it would be more cost-effective but would adversely affect coal production in West Virginia. Not surprisingly, West Virginia legislators (notably Senator Byrd) opposed such discretion.

Risk-Risk Analysis

Perhaps in part because of the long-term failure of government agencies to adopt a balanced benefit-cost approach, economists have developed a series of other more limited tests that can be applied to policy. Three variants of this approach come under the heading of risk-risk analysis—that is, to compare the risks generated by the regulation with the risks reduced by the regulation to determine the net risk effects. The basic idea of this methodology is that government regulations have competing effects and that, even if one's sole concern is with risk levels, some regulations may not be desirable. Some thinking from this approach has been incorporated into proposed legislation.

The first type of risk-risk tradeoff is what economists might term moral hazard risks but which the regulatory reform legislation has termed "substitution risks."¹⁶ In his analysis of the effect of seat belts on auto safety, for example, Peltzman (1975) hypothesized that drivers would drive faster and become less careful after wearing seat belts because the safety benefits from added care had been diminished. His empirical evidence suggested that offsetting behavior on the part of drivers may have accounted for the very weak effect that seat belts seem to have had on traffic safety. Other studies suggest that seat belts may have enhanced driver safety but may increase the risks to pedestrians and motorcyclists. However, there is considerable controversy with respect to the magnitude of the effect (Blomquist, 1988).

A variant of this moral hazard risk stems from what Viscusi (1984) termed the "lulling effect." Consumers may be lulled into a false sense of security by the existence of safety mechanisms. In the case of safety caps designed to prevent child

¹⁵ See, for example, S. 291 and S. 343.

¹⁶ H.R. 1022, for example, includes extensive provisions requiring that agencies recognize substitution risks and incorporate them into their analysis. Graham and Wiener (1995) consider a variety of these examples, as does Lave (1981).

poisonings, there is evidence that parents became excessively lax about access to the products once the caps were in place. The result is that there is no significant enhancement of the safety of products for which the caps were intended, and there was an apparent increase in risks for other risky products as the decrease in parental responsibility had apparent spillover effects with respect to safety protections more generally.

A second class of risk-risk analysis begins by noticing that regulatory efforts frequently generate new economic activity; for example, perhaps to manufacture pollution control devices or remove waste from hazardous waste sites. These risks, like most other economic activity, also generate new hazards. Viscusi and Zeckhauser (1994) show that the occupational risk cost of expenditures is approximately 3 to 4 percent of total costs, on average. Thus, every time the government incurs \$100 million in regulatory costs, injuries and deaths created by these expenditures will have a total value of \$3–4 million. This loss can become consequential in terms of assessing the overall attractiveness of the effort, particularly if the regulatory policy is extremely ineffective. If one assumes that 4 percent of all costs are fatality and injury costs, then there will be \$5 million of fatality and injury losses for every \$125 million in expenditures. Suppose the policy directly saves one statistical life for each \$125 million in costs. If the implicit value of life is \$5 million, then this policy will be exactly a break-even proposition in risk terms since it saves and loses one statistical life for each \$125 million expenditure. For the regulations in Table 2 for which the cost per life saved exceeds \$125 million, the value of the health losses directly generated by the regulation will be at least as great as the value of the health benefits provided by the regulation.

A third version of risk-risk analysis provides perhaps the strongest test of regulatory attractiveness. Regulatory expenditures, in effect, make society poorer by diverting resources that could be used for other purposes, such as food and housing. Because there is a link between higher income and longevity, the opportunity costs from regulations will impose mortality costs.

A vivid way to pose the empirical issue here is to determine what level of regulatory expenditure will lead to a statistical death. Using data relating international mortality rates to income levels, Lutter and Morrall (1994) calculate the expenditure level per statistical death to be between \$9 million to \$12 million. Of course, assessments such as these raise a variety of concerns, such as disentangling the simultaneous nature of the health-mortality linkage, as discussed by Smith, Epp and Schwabe (1994) and others. A more fundamental issue is the plausibility of this value range. Since evidence suggests that society is willing to spend \$3–\$7 million to save a statistical life, it seems unlikely that an only slightly higher expenditure would lead to the loss of a statistical life. It would barely be consistent to, on the one hand, be willing to spend, say, \$7 million to save a statistical life, if every time we spent \$9 million there was the loss of a statistical life. If that were the case, life saving expenditures would barely be a break-even proposition.

An alternative approach introduced in Viscusi (1994) gives another way to think about the expenditure level that leads to a statistical death. Instead of an

econometric approach, this concept is specifically linked to estimates of the implicit value of saving a life. To be more specific, it relies on the insight that the expenditure level that leads to a statistical death equals the implicit value of life divided by the marginal propensity to spend on mortality-reducing commodities. Using this approach, Viscusi estimated that \$50 million in expenditures would lead to the loss of a statistical life, which is a number that is more consistent with estimates of the amount society is willing to spend to save statistical lives.

The various approaches of risk-risk analysis are in early stages of development and remain controversial. However, as noted earlier, utilization of a risk-risk test has been suggested by a federal court judge as well as by a head of the OMB regulatory oversight group.¹⁷ These risk-risk tests are only very partial tests of policy efficacy. But if benefit-cost analysis is not permitted, then some much weaker test can at least help in weeding out the most inefficient regulations. Naturally, the ideal outcome is to develop a meaningful overall test of the attractiveness of regulatory policies so that it will not be necessary to resort to these more partial policy evaluation criteria.

The Science and Bias of Risk Assessment

Along with benefit-cost analysis, guidelines for risk assessment comprise the core of all the regulatory reform proposals. These issues may seem largely scientific, but they also pertain to the appropriate economic policy criteria for policy assessment as well. The issue is whether government agencies should use “conservative” risk assessments that pertain to upper bounds, even if these involve unlikely scenarios that might create particularly adverse consequences, or whether they should rely instead on unbiased risk assessments pertaining to the mean risk.

From a statistical decision theory standpoint, if we are concerned with maximizing the expected benefits of government efforts, we should rely upon the mean risk values in making these assessments rather than some other value along the risk distribution. However, the prevailing practice in the federal government is to utilize some kind of upper bound for the risk in the interest of “conservatism.” This bias toward conservatism can intrude upon the risk assessment to a considerable extent (Nichols and Zeckhauser, 1986) because it is typically manifested on a parameter by parameter basis, not simply by selecting the 95th percentile of the overall risk distribution. Thus, in the case analysis of Superfund risks from groundwater contamination, the agency uses the maximum concentration of the chemical found at the site and an upper bound value of four other parameters to calculate the risk. The result is that the sequence of conservative assumptions is compounded, so that the overall degree of conservatism is much greater. Indeed, in the case of

¹⁷ See in particular *UAW v OSHA*, United States Court of Appeals for the District of Columbia Circuit 89-1559 and the letter from James MacRae, Acting Administrator, Office of Information and Regulatory Affairs to Nancy Risque-Rohrbach, Assistant Secretary for Policy, U.S. Department of Labor, Washington, D.C., September 16, 1992.

Superfund, the estimated risk values are well beyond the 99th percentile of the overall risk distribution (Viscusi and Hamilton, 1996).

It is probably impossible for policymakers to ascertain the degree of conservative bias. The extent of the bias varies according to agency and even according to the particular policy action within each agency. Since government analysts do not typically report the lower bound or the mean risk assessment, policymakers have no sense of the true risk, only what might prevail under a worst case scenario. Virtually all the regulatory reform bills would require that the agency report some type of mean or central tendency of the risk. If agencies choose to report an upper bound, the bills would also require them to report a lower bound so that policy analysts can assess the range of risk and scientific opinion.

This controversy relates more generally to the economic problems arising with respect to risk ambiguity. The well-known Ellsberg paradox (1961), for example, demonstrated that individuals have a preference for precise opportunities of winning a prize. In particular, how do people react to "hard" probabilities, such as those based on detailed objective evidence as opposed to "soft" probabilities that are subjectively determined relying primarily on individual judgment? A rational decision maker should be indifferent to a lottery that offers a "hard" 0.5 probability of a prize to a lottery that offers a "soft" 0.5 probability that is known with less precision; for example, people prefer choosing a black or white ball from an urn where the proportion of balls is known to be half and half, rather than choosing from an urn where they do not know the proportion of balls and thus must make a rational default assumption that the chance of drawing a black or white ball is 50:50. People generally prefer the lottery for which the probability is known with precision. In the loss dimension, the counterpart result is that people are averse to ambiguous chances of harms, including those from environmental damage (Viscusi, 1992). This anomaly does not arise because of risk aversion. Rather, there is aversion to imprecisely defined probabilities, which is one of the classic contradictions of economic rationality. One possible explanation for the conservatism bias is that government agencies have institutionalized the ambiguity aversion bias in decisionmaking through their risk assessment practices.

From a policy standpoint, providing a fuller statistical characterization could eliminate potential distortions in regulatory priorities. Suppose that for Policy *A* the risk of cancer is 59 per million and that this probability is known with precision, whereas with Policy *B* the scientists are evenly divided as to whether the risk is zero or 60 per million. Their mean risk assessment is 30 per million. Current risk assessment practices would summarize the risk levels based solely on the upper bound values, giving Policy *B* a higher risk ranking even though its mean value is about half that of Policy *A*, and its upper bound value is almost the same as the risk for Policy *A* that is known with precision. The result is that agencies tilt policy priorities toward risks that are least precisely understood rather than those risks for which the expected benefits to society from regulation are the greatest. Legislation to change this treatment of uncertainty could save a greater expected number of lives.

Conclusion

The controversy over the regulatory reform legislation is really over the practical applicability of economic principles. In the abstract, it is difficult (at least for an economist) to disagree with benefit-cost analysis. But in practice, what provision should be made for benefits that cannot be quantified? Must all benefits and costs be monetized? Should estimation of risks be delegated to scientists? Is there a legitimate role for the public to play in deciding whether these risk estimates should be taken from the conservative edge of existing estimates or from the mainstream? The policy debate over applying benefit-cost analysis has been further clouded because the bills include a myriad of institutional reforms that would affect the process of issuing regulation and could often lead to additional delays, such as the establishment of peer review panels and judicial review.

Almost since the inception of the risk and environmental agencies in the early 1970s, there has been a continuing concern with ensuring that regulations yield societal benefits commensurate with their costs. This recognition of the need for balance, in turn, has led policymakers to seek a greater role for economists, and the principles of economic analysis undoubtedly will continue to play a central role in the debate over the future of regulatory policy.

References

- Blomquist, G.**, *The Regulation of Motor Vehicle and Traffic Safety*. Boston: Kluwer Academic Publishers, 1988.
- Carlin, Alan**, "The United States Experience with Economic Incentives to Control Environmental Pollution," draft, EPA Office of Policy, Planning and Evaluation, No. 230-R-92-001, February 1992.
- Carson, Richard, et al.**, "Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez," discussion paper, Resources for the Future, 1994.
- Carter, Jimmy**, "Improving Government Regulations, Executive Order 12044." March 23, 1978. In *Public Papers of the President of the United States, Jimmy Carter, 1978, Book I: January 1 to June 30, 1978*. Washington, D.C.: U.S. Government Printing Office, 1979, pp. 558-61.
- Clinton, Bill**, "Regulatory Planning and Review, Executive Order 12866," September 30, 1993. In *Weekly Compilation of Presidential Documents, 1993: October-December Index*. Vol. 29, Nos. 39-52, Washington, D.C.: U.S. Government Printing Office, 1993, pp. 1925-33.
- Crandall, Robert**, *Controlling Industrial Pollution: The Economics and Politics of Clean Air*. Washington, D.C.: Brookings Institution, 1983.
- Diamond, Peter, and Jerry Hausman**, "Contingent Valuation: Is Some Number Better Than No Number?" *Journal of Economic Perspectives*, 1994, 8:4, 45-64.
- Ellsberg, Daniel**, "Risk, Ambiguity, and the Savage Axioms," *Quarterly Journal of Economics*, November 1961, 75, 643-69.
- Ford, Gerald**, "Inflation Impact Statements, Executive Order 11821," 3 Code of Federal Regulations, November 27, 1974, 926.
- Graham, John D., and Jonathan B. Wiener, eds.**, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge: Harvard University Press, 1995.
- Hopkins, Thomas D.**, "Costs of Regulation: Filling the Gaps," report prepared for

Regulatory Information Service Center, Washington, D.C., August 1992.

Hanemann, W. Michael, "Valuing the Environment Through Contingent Valuation," *Journal of Economic Perspectives*, 1994, 8:4, 19-43.

Lave, L. B., *The Strategy of Social Regulation: Decision Frameworks for Policy*. Washington, D.C.: Brookings Institution, 1981.

Lutter, Randall, and John F. Morrall, III, "Health-Health Analysis: A New Way to Evaluate Health and Safety Regulation," *Journal of Risk and Uncertainty*, 1994, 8:1, 43-66.

Morrall, John F., III, "A Review of the Record," *Regulation*, 1986, 10:2, 25-34.

Nichols, Albert, and Richard J. Zeckhauser, "The Perils of Prudence: How Conservative Risk Assessments Distort Regulation," *Regulation*, 1986, 10:2, 13-24.

Peltzman, Sam, "The Effects of Automobile Safety Regulation," *Journal of Political Economy*, 1975, 83:4, 677-725.

Portney, Paul, "The Contingent Valuation Debate: Why Economists Should Care," *Journal of Economic Perspectives*, 1994, 8:4, 3-17.

Reagan, Ronald, "Federal Regulation, Executive Order 12291," February 17, 1981. In *Public Papers of the President of the United States, Ronald Reagan, 1981: January 20 to December 31, 1981*.

Washington, D.C.: U.S. Government Printing Office, 1982, pp. 104-08.

Smith, V. Kerry, Donald Epp, and Kurt Schwabe, "Cross-Country Analyses Don't Estimate Health-Health Responses," *Journal of Risk and Uncertainty*, 1994, 8:1, 67-84.

Viscusi, W. Kip, "The Lulling Effect: The Impact of Child-Resistant Packaging on Aspiring and Analgesic Ingestions," *American Economic Review*, May 1984, 74, 324-27.

Viscusi, W. Kip, *Fatal Tradeoffs: Public and Private Responsibilities for Risk*. New York: Oxford University Press, 1992.

Viscusi, W. Kip, "The Value of Risks to Life and Health," *Journal of Economic Literature*, 1993, 31:4, 1912-46.

Viscusi, W. Kip, "Mortality Effects of Regulatory Costs and Policy Evaluation Criteria," *RAND Journal of Economics*, Spring 1994, 25:1, 94-109.

Viscusi, W. Kip, and James T. Hamilton, "Cleaning Up Superfund," *The Public Interest*, 1996 (in press).

Viscusi, W. Kip, and Richard Zeckhauser, "The Fatality and Injury Costs of Expenditures," *Journal of Risk and Uncertainty*, 1994, 8:1, 271-93.

Wilson, Richard, "Analyzing the Daily Risks of Life," *Technology Review*, 1979, 81:4, 40-46.