

CLE READING MATERIALS

The Sense Behind the Noise on Trump's Regulation Policy

FOR

12:00 p.m. – 1:00 p.m.

KEYNOTE

- **Cass Sunstein**, Robert Walmsley University Professor, Harvard Law School; former Administrator of the Office of Information and Regulatory Affairs
- In conversation with: **E. Donald Elliott**, Professor, Yale Law School; Senior of Counsel, Covington & Burling LLP; former Assistant Administrator and General Counsel of the U.S. Environmental Protection Agency

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The Sense Behind the Noise on Trump's Regulation Policy

Overall, the benefits of federal rules far outweigh the costs, according to a White House report.

By [Cass R. Sunstein](#)

March 1, 2018, 9:00 AM EST



It's not that simple. *Photographer: Saul Loeb/AFP/Getty Images*

Very quietly, the Trump administration recently issued a draft of its annual report on the costs and benefits of federal regulations. It's a responsible and highly professional document – and a corrective to the noisiest claims, from both the White House and its critics, on the whole topic of regulation.

The report is required by the Regulatory Right-to-Know Act, enacted in 2000. Since that time, Republican and Democratic administrations have cataloged the costs and benefits of federal regulations. In an era of sharp partisan divisions, there has been a high degree of continuity across administrations in terms of the basic aspiration to careful analysis, free from political interference.



This year's report is especially interesting, because the Trump administration's Office of Information and Regulatory Affairs is cataloging the work of its predecessors – above all, that of the Barack Obama administration. ^[1] The report's numbers suggest that the benefits of previous regulations far exceeded their costs.

In fiscal year 2016, for example, the anticipated costs of regulations range from \$3.3 billion to \$4.6 billion – but the anticipated benefits range from \$13.6 billion to \$27.3 billion. (The range accounts for uncertainty about the precise numbers.) That means that the net benefits are, at a minimum, a whopping \$9 billion – \$24 billion at a maximum.

The report also offers a 10-year accounting, with eight of those years coming under Obama. The estimated aggregate costs are between \$59 billion to \$88 billion. The aggregate benefits are much higher than that: between \$219 billion to \$695 billion.

Not only are the net benefits high, but the numbers also show a degree of discipline on the cost side. A range of \$5.9 billion to \$8.8 billion per year is far from modest, and it would be great to reduce it, but in comparative terms, it's not unmanageable. For comparison, the annual budget of the Department of Transportation has recently been in the vicinity of 10 times that amount.

At the same time, the report offers some important caveats. First, it emphasizes that for some rules, agencies failed to offer a complete accounting of costs and benefits – and that independent agencies, such as the Federal Reserve and the Securities and Exchange Commission, often fail to monetize benefits and costs at all.

That's not good. The report rightly notes "that for the purposes of informing the public and obtaining a full accounting, it would be highly desirable to obtain better information on the benefits and costs of the rules issued by independent agencies."

Second, the report observes that the current figures – for quantifying both benefits and costs – depend on assumptions that might turn out not to be true. It strikes just the right note when it states that the report was issued after a change in administration, and that its figures do "not imply an endorsement by the current Administration of all of the assumptions made and analyses conducted at the time these regulations were finalized."

Third, the report draws attention to uncertainties. One example: It's not easy to turn the protection of homeland security, or of personal privacy, into monetary equivalents.

Another example: Many of the reported benefits come from reducing a single air pollutant: particulate matter. But scientists disagree about the magnitude of those benefits. Some forms of particulate matter may have more serious adverse effects than others. If some forms are significantly less toxic than others, then the benefits of reductions will be lower than currently expected.

In accordance with tradition, the new cost-benefit report offers recommendations for reform. Importantly, the Trump administration embraces the commitment to cost-benefit analysis as "the primary analytical tool to inform specific regulatory choices." Since that commitment was initially imposed by President Ronald Reagan, it's not exactly a big surprise that a Republican successor would reaffirm it. Nonetheless, it's excellent news.

At least as much as any of its predecessors, the report emphasizes the importance of deregulation, including the elimination of rules that are "outdated, unnecessary, or ineffective,"

or that impose “costs that exceed benefits.” It also draws attention to the need to reassess past regulations, with clear emphasis on their actual (as opposed to merely anticipated) effects.

Here, as well, there is a bipartisan consensus. We need far more evidence on the concrete effects of existing regulations – whether they are imposing high costs, whether they can be streamlined, whether they are delivering big benefits.

There’s a lot of chest-thumping on regulation, both by those who act as if it’s the most serious problem facing the United States today, and by those who have never seen a health or safety regulation they don’t like. This week’s sober, fair-minded report is a reminder that everything turns on the numbers – and that political dogmas mask all of the serious questions.

1 Disclosure: I was administrator of the Office of Information and Regulatory Affairs from 2009 to 2012, and helped to oversee regulation and the annual cost-benefit report during those years.

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Cost-Benefit Analysis and the Environment*

Cass R. Sunstein

In the United States, cost-benefit analysis (CBA) is in the ascendancy. For over twenty years, American presidents have required agencies to perform CBA for major regulations; indeed, they have told agencies to regulate only if the benefits of regulation justify its costs.¹ Congress has also shown considerable interest in CBA, most prominently in the Safe Drinking Water Act, which asks agencies to produce quantitative assessments of both costs and benefits. For their part, federal courts have adopted a series of principles that promote CBA, saying that if Congress has not been clear, agencies may consider costs, take account of the substitute risks introduced by regulation, and exempt trivial risks from governmental control.

In its enthusiasm for cost-benefit analysis, the United States provides a sharp contrast to Europe, which has shown intense interest in a quite different organizing principle for environmental protection: the Precautionary Principle.² According to the Precautionary Principle, regulation is required even in the face of scientific uncertainty—even if it is not yet clear that environmental risks are serious. A central point of the Precautionary Principle is to recognize the limitations of existing knowledge and to protect against harm that cannot yet be established as such.

Cost-benefit analysis and the Precautionary Principle can lead in

* I am grateful to Elizabeth Emens, Charles Larmore, Martha Nussbaum, and Richard Posner for extremely valuable comments on an earlier draft of this article.

1. The developments discussed in this paragraph are traced in Cass R. Sunstein, *Risk and Reason* (Cambridge: Cambridge University Press, 2002).

2. See, e.g., Arie Trouwborst, *Evolution and Status of the Precautionary Principle in International Law* (London: Kluwer Law International, 2002); Poul Harremoes et al., eds., *The Precautionary Principle in the 20th Century: Late Lessons from Early Warnings* (London: Earthscan, 2002).

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radically different directions. For example, many Europeans argue that the consequences of genetic modification are uncertain, that real harm is possible, and hence that stringent regulation is readily justified. By contrast, many Americans respond that the likely benefits of genetic modification are far greater than the likely harms and that stringent regulation is therefore unsupportable. Or consider global warming. Many European leaders have argued in favor of precautions, even extremely expensive ones, simply to reduce the risk of catastrophe. But under President George W. Bush, American officials have called for continuing research on the costs and benefits of controlling greenhouse gas emissions.

The tension between CBA and the Precautionary Principle raises serious questions about the theory and practice of environmental protection. To engage in cost-benefit analysis, regulators must make difficult and often speculative judgments about the likely effects of alternative regulatory strategies.³ The easiest task is often the identification of costs, but even here there are formidable empirical problems. It is difficult to project the expense of regulations of different levels of stringency, especially because environmental protection often spurs technological innovation, greatly reducing the cost of pollution reduction. The identification of benefits presents even harder empirical problems—and knotty normative and conceptual ones as well. At a minimum, agencies must estimate the savings that are likely to result from regulation, including reductions in mortality and morbidity, along with improvements in terms of visibility, recreation, aesthetics, animal welfare, property values, and more. When science leaves room for doubt, as it often does, agencies typically specify a range of possibilities, representing low-end estimates and high-end estimates in addition to the best point estimate. Agencies might, for example, project that a certain regulation will save as many as eighty lives each year and as few as zero, with a preferred estimate of twenty-five.⁴ These numbers inevitably involve a degree of guesswork.

After specifying the likely benefits, CBA requires agencies to engage in multiple acts of conversion, assigning economic values to human lives, human morbidity, and a range of harms to the environment. Typically American agencies assign monetary values on the basis of private “willingness to pay” (WTP).⁵ For example, the Environmental Protection

3. The Office of Management and Budget has issued guidelines to govern and to standardize the use of cost-benefit balancing. See Office of Management and Budget, “Regulatory Analysis,” Circular A-4 (September 17, 2003), available at <http://www.whitehouse.gov/omb/inforeg/regpol.html#rr>.

4. See Cass R. Sunstein, “The Arithmetic of Arsenic,” in *Risk and Reason*, pp. 153–90.

5. See W. Kip Viscusi, *Fatal Tradeoffs* (New York: Oxford University Press, 1993).

Agency (EPA) values a human life at about \$6.1 million, a figure that comes from real-world markets.⁶ In the workplace and for consumer goods, additional safety has a price; market evidence is investigated to identify that price. The \$6.1 million figure, known as the value of a statistical life (VSL), is mostly a product of studies of actual risks from the workplace and consumer products, attempting to determine how much workers and consumers are paid to assume mortality hazards. Suppose that people must be paid \$600, on average, to eliminate risks of 1/10,000; suppose, for example, that workers who face risks of that magnitude generally receive \$600 in additional wages each year. If so, the VSL would be said to be \$6 million. Where market evidence is unavailable, agencies often produce monetary valuations on the basis of contingent valuation surveys, which ask people how much they are willing to pay to save coral reefs or endangered species, to eliminate a risk of chronic bronchitis or curable lung cancer, and much more. Drawing on market evidence and contingent valuation studies, the EPA has recently valued a case of chronic bronchitis at \$260,000, an emergency hospital visit for asthma at \$9,000, hospital admission for pneumonia at \$13,400, a lost work-day at \$83, and a specified decrease in visibility at \$14.⁷

Once a CBA is produced, what should be done with it? The most ambitious answer is that agencies should adopt regulations only when the likely benefits exceed the likely costs—and that if several regulations meet this test, agencies should select the one that “maximizes net benefits.” On this approach, CBA provides a clear rule of decision, one by which regulators should be bound. A more cautious response would be that agencies should generally require benefits to exceed costs, and also seek to maximize net benefits, but that they need not do so; on this view, the outcome of the CBA provides a presumption but no more. The presumption could be rebutted by showing that the particular situation justifies a departure from the result indicated by CBA—as, plausibly, in cases in which poor people would stand to gain a great deal. A still more cautious approach would be that in deciding what to do, agencies should consider the outcome of CBA alongside such other variables as they deem relevant. There are important differences between those who would make CBA determinative and those who would merely make it relevant. But even on the most cautious understandings of the role of CBA, government’s choices would be significantly affected by the translation of environmental benefits into monetary equivalents.

6. See Frank Ackerman and Lisa Heinzerling, *Priceless: On Knowing the Price of Everything and the Value of Nothing* (New York: New Press, 2003).

7. See Cass R. Sunstein, *The Cost-Benefit State* (Washington, D.C.: American Bar Association, 2002), p. 145.

To say the least, it is highly controversial to say that people's protection against environmental risks is properly measured by their WTP to avoid those risks. It is at least equally controversial to use WTP as the basis for policies protecting endangered species, nature, and wildlife. But the Precautionary Principle raises serious problems of its own. How much precaution is the right level of precaution? Are costs relevant to the answer? In any case human beings face a number of risks, not simply one, and any effort to reduce one risk might well increase another risk. Is it possible, even in principle, to take precautions against all risks, rather than a subset? If all risks cannot be reduced at once, how should regulators set priorities?

In this essay, I approach these questions through a discussion of three illuminating books that offer radically different approaches to environmental protection. Frank Ackerman and Lisa Heinzerling believe that CBA is a hopelessly crude tool, one that buries indefensible judgments of morality and politics.⁸ Drawing on the war on terrorism, they argue for the Precautionary Principle instead. By contrast, Adam Burgess uses the controversy over cell phones to suggest that the Precautionary Principle capitulates to, and even promotes, baseless public fears.⁹ Objecting to what he sees as excessive fear of new technologies, Burgess argues for careful attention to scientific evidence and for regulation only when the risk is real. Richard Posner argues for CBA and economic analysis in a context in which it seems least promising: catastrophic risk.¹⁰ He contends that global warming, and other potentially catastrophic problems, cannot sensibly be approached without a disciplined effort to quantify and monetize both costs and benefits. But where Ackerman and Heinzerling see CBA as an excuse for regulatory inaction, Posner invokes CBA on behalf of aggressive controls on greenhouse gases and other sources of potentially serious danger. Indeed his central goal is to draw private and public attention to catastrophic risks that are exceedingly unlikely to come to fruition.

Building on the arguments made by Burgess and Posner, I shall mount a qualified defense of CBA here. Without some sense of both costs and benefits—both nonmonetized and monetized—regulators will be making a stab in the dark. Human beings have a great deal of difficulty in assessing risks, making them prone to both hysteria and neglect; CBA does not supply definite answers, but it can help to establish

8. See Ackerman and Heinzerling.

9. See Adam Burgess, *Cellular Phones, Public Fears, and a Culture of Precaution* (Cambridge: Cambridge University Press, 2004).

10. See Richard A. Posner, *Catastrophe: Risk and Response* (New York: Oxford University Press, 2004).

which risks are serious and which are not.¹¹ By contrast, the Precautionary Principle approaches incoherence. Because risks are on all sides of social situations, and because regulation itself increases risks of various sorts, the principle condemns the very steps that it seems to require.

But building on the arguments made by Ackerman and Heinzerling, I shall suggest that there are two serious problems with CBA. The first is that WTP is sometimes an inappropriate basis for environmental policy. Human beings are citizens, not merely consumers, and their consumption choices, as measured by WTP, might be trumped by their reflective judgments as citizens. In any case, WTP is dependent on ability to pay; when the poorest members of societies stand to gain from environmental protection, they should be protected even if their poverty ensures that their WTP is low. The second problem is that regulators cannot always assign probabilities to environmental outcomes. If probabilities cannot be assigned, regulators are unable to engage in CBA; they might do well to follow the maximin principle, taking steps to avoid the worst-case scenario. This point helps pave the way toward a narrower and more refined use of the Precautionary Principle, one that has important real-world applications and that provides a valuable complement to approaches based on CBA.

I. MONETIZATION AND ITS DISCONTENTS

Ackerman and Heinzerling do not object to efforts to specify the range of outcomes associated with alternative courses of action.¹² Their principal objection is to the WTP criterion. Insisting that human deaths are not mere “costs,” Ackerman and Heinzerling contend that CBA is morally obtuse. They argue that a well-functioning democracy should respect the informed judgments of citizens rather than aggregate private consumption choices. Ackerman and Heinzerling much prefer the Precautionary Principle, which, in their view, is “a more holistic analysis” that argues for regulation in the face of scientific uncertainty and that is “committed to fairness within and beyond this generation” (p. 234).

Ackerman and Heinzerling are aware that many people have turned to CBA because of widely publicized studies that purport to show a high

11. See Allan Gibbard, “Risk and Value,” in *Values at Risk*, ed. Douglas MacLean (Totowa, N.J.: Rowman & Allanheld, 1986), p. 94, for an exploration of “a principal rationale for wanting something like risk-cost-benefit analysis: for seeking a way to regiment our judgments about risk, and so to avoid the blatant irrationalities of unaided common sense.”

12. I discuss their book for a popular audience in Cass R. Sunstein, “Your Money or Your Life,” *New Republic* (March 15, 2004), p. 27; my treatment here borrows from that discussion.

level of arbitrariness in modern regulation.¹³ According to such studies, regulations in the United States are wildly inconsistent. Sometimes the United States spends \$100,000 (or less) to save a human life. Sometimes it spends tens of millions. Cost-benefit supporters ask: shouldn't nations be devoting their resources to serious health problems rather than trivial ones? If a nation can spend ten million dollars to save one thousand lives, shouldn't it do that rather than waste the money on a similarly priced program that saves only one or two people? In any case, human beings make many errors in assessing risks, using heuristics and demonstrating biases that make them exaggerate some dangers and underestimate others.¹⁴ These errors seem to be replicated in existing policies; CBA might be defended as a promising corrective to blunders in citizens' perception of risk. In these ways, interest in CBA has been fueled less by contentious claims of value than by the pragmatic suggestion that it can assist in more intelligent priority setting.¹⁵

Ackerman and Heinzerling believe that the attack on the current system is based on misleading studies, burying controversial and indeed implausible judgments of value. True, some regulations do not prevent many deaths, but they do prevent serious (nonfatal) harms to human health and also harms to ecosystems. The resulting benefits should not be disparaged. More fundamentally, Ackerman and Heinzerling argue that the key studies find low benefits partly because they greatly discount future gains to life and health. Everyone agrees that a dollar today is worth more than a dollar in twenty years; economists use a standard "discount rate" (often 7 percent annually) to convert future dollars into current equivalents. In calculating the benefits of regulation, they use the same discount rate for lives saved and illnesses averted. Ackerman and Heinzerling contend that this approach wrongly shrinks the value of regulations that will save people in the future. One of their central

13. The most well-known is John F. Morrall III, "A Review of the Record," *Regulation* (November/December 1986): 25-29, p. 30, table 4. For an updated treatment, see John F. Morrall III, "Saving Lives: A Review of the Record," *Journal of Risk and Uncertainty* 27 (2003): 221-37.

14. A good collection is Thomas Gilovich et al., eds., *Heuristics and Biases: The Psychology of Intuitive Judgment* (Cambridge: Cambridge University Press, 2002). For use of this idea in (qualified) defense of CBA, see Gibbard.

15. David M. Driesen, *The Economic Dynamics of Environmental Law* (Cambridge, Mass.: MIT Press, 2003), offers a powerful criticism of CBA insofar as it offers a static account of both costs and benefits and fails to see that regulation and other forces often produce innovation, thus reducing the expense of environmental protection. I believe that this argument is best taken as a reason for skepticism about existing figures about likely costs, rather than as an attack on CBA as such. See Matthew Adler, "Cost-Benefit Analysis, Static Efficiency, and the Goals of Environmental Law," *Environmental Affairs Law Review* 31 (2004): 591-600.

claims, then, is that the standard discount rate should not be applied to future savings in terms of life and health.

Suppose that their arguments are right—that once economic values are properly assigned to environmental gains, few existing regulations will be condemned as requiring huge investments for trivial benefits. Regulators still might want to use cost-benefit analysis to improve current decisions.¹⁶ Ackerman and Heinzerling complain that to do this, they will have to produce a dollar value for a human life—and any such effort will be arbitrary, offensive, or worse. They reject the view that WTP, based largely on workplace studies, produces information that agencies should use. In their view, workers often have little information about the risks that they face, and hence they cannot be charged with consciously trading hazards against dollars. Even when workers are informed, they may have few options and hence little choice. If they accept a job with significant hazards for a low premium, it is not because they are genuinely free to choose.

Some anomalies in the empirical literature are highly relevant here. Nonunionized workers have sometimes been found to receive little or nothing for the reduction of statistical risks, and African-Americans have been found to receive much less than white people do.¹⁷ Does it follow that regulators should treat the lives of nonunionized workers, or African-Americans, as worth especially little? Ackerman and Heinzerling add that the key studies ask only how much individuals care about risks to themselves. They ignore the fact that many of us value the lives of others too. I might be willing to pay only \$60 to eliminate a 100,000 risk that I face, but I might be willing to pay much more than that to eliminate the same risk from my child's life and substantial amounts to help reduce the risks of my friends. Altruism is ignored in the current calculations.

Ackerman and Heinzerling also contend that statistically equivalent risks should not be treated the same, because people's valuations of mortality risks depend not only on the probability of harm but also on their nature and their context. About 3,000 people died from the terrorist attacks of 9/11—a much smaller number than die each year from suicide (30,500), motor vehicle accidents (43,500), and emphysema (17,500). Ackerman and Heinzerling approve of the fact that the reaction of the United States to the 9/11 attacks was not based on simple numerical comparisons. Drawing on work by psychologist Paul Slovic, Ackerman and Heinzerling emphasize that the risk judgments of or-

16. See W. Kip Viscusi, *Rational Risk Regulation* (Cambridge: Cambridge University Press, 2001).

17. John D. Leeth and John Ruser, "Compensating Wage Differentials for Fatal and Nonfatal Injury Risk by Gender and Race," *Journal of Risk and Uncertainty* 27 (2003): 257–77.

dinary people diverge from the risk judgments of experts—not because ordinary people are stupid or confused, but because they have a different normative framework for evaluating risks.¹⁸ While experts focus on the number of deaths at stake, most people are especially averse to risks that are unfamiliar, uncontrollable, involuntary, irreversible, inequitably distributed, man-made, or catastrophic.¹⁹ Diverse valuations of diverse risks should play a role in regulatory policy.

For example, most of us are not greatly troubled by the cancer risks associated with x-rays, partly because they are voluntarily incurred. By contrast, the risks of terrorism and even pesticides and air pollution are more alarming because individuals cannot easily control them. And when a risk is faced by an identifiable community—as, for example, when landfills with toxic chemicals are located in largely poor areas—the public is especially likely to object to what it will perceive as unfairness.²⁰ Ackerman and Heinzeling thus complain that CBA disregards important qualitative differences among quantitatively identical risks. It also tends to ignore, and often to reinforce, patterns of social inequality, above all because it pays no attention to a key question, which is distributional: who receives the benefits and who incurs the costs? For both domestic and international environmental issues, Ackerman and Heinzeling emphasize the importance of fairness. If environmental threats mostly burden poor people, regulators should take that point into account, whatever the cost-benefit ratio.

Ackerman and Heinzeling are also concerned about how cost-benefit analysts value nature. How much will human beings pay to save an animal or a member of an endangered species? Economists have tried to answer the question by actually asking people. For example, one study finds that the average American family is willing to pay \$70 to protect the spotted owl, \$6 to protect the striped shiner (an endangered fish), and as much as \$115 per year to protect major parks against impairment of visibility from air pollution. Ackerman and Heinzeling ridicule these numbers, complaining that any precise monetary value fails to provide useful information. Bans on whaling, for example, are rooted in a widely shared ethical judgment, not on cost-benefit analysis. A democracy should make its decisions about the protection of nature

18. See Paul Slovic, *The Perception of Risk* (London: Earthscan, 2000).

19. But see Howard Margolis, *Dealing with Risk* (Chicago: University of Chicago Press, 1999), for a challenge to this account of the lay/expert division in risk perceptions.

20. Note, however, that the Not In My Backyard Syndrome—known in the trade as NIMBY—suggests that many people will make self-serving judgments about the proper location of environmentally risky activities. This point is related to the suggestion, developed below, that people tend to become intuitive cost-benefit analysts when both the benefits and the costs of environmental regulation are on-screen.

on the basis of such ethical judgments rather than by aggregating people's willingness to pay.

Ackerman and Heinzerling offer a final objection to CBA: the rights of future generations. I have noted that economists generally apply a discount rate to future gains and losses. With a 7 percent discount rate, \$1,000 in twenty years is worth only \$260 today. Cost-benefit analysts within the federal government have long applied a standard discount rate for money (7 percent) to the benefits of safety and health regulation, so that prevention of 1,000 fatal cancers in 2025 is equivalent to the prevention of 260 fatal cancers in 2005. Ackerman and Heinzerling respond that lives are not like money; they cannot be placed in a bank for the accumulation of interest. A discount rate of 7 percent radically shrinks the value of reductions in risk for those born, say, one hundred years from now. But current generations owe obligations to the future and should not discount measures that protect people not yet born.

Invoking the Precautionary Principle, Ackerman and Heinzerling argue that nations are obliged to take action against serious threats even before there is a scientific consensus. Above all, they want regulators to make regulatory decisions by attending to the worst-case scenario. If the worst case is extremely bad, aggressive regulation is desirable even if it might result in wasted money. When a nation spends too much on regulatory protection, it loses limited resources, which admittedly is undesirable; but waste is far better than catastrophe. Hence their "preference is to tilt toward overinvestment in protecting ourselves and our descendants" (p. 227). Ackerman and Heinzerling note that this approach was taken in the context of the military spending in the Cold War, arguing that the nation rightly prepared for the high-risk case. They see protection against terrorism in similar terms. Ackerman and Heinzerling want to treat health and environmental risks in the same way.

II. POINTLESS PRECAUTIONS?

Ackerman and Heinzerling do not focus in detail on any particular regulatory issue. By contrast, Burgess explores the idea of "precaution" with close reference to a single controversy: the health risks associated with cellular phones. Burgess does not explicitly discuss CBA, but he is highly skeptical of the Precautionary Principle, which, in his view, leads regulators to capitulate to baseless public fear. One of Burgess's central claims is that public fears are often manufactured rather than found; for this reason, Burgess describes himself as a "social constructivist" (p. 11). But with respect to risk, Burgess is no constructivist at all. He believes that some risks are serious and that others are not, and that science is the best way to tell the difference.

Burgess contends that notwithstanding countless efforts, no repu-

table study has demonstrated significant health risks as a result of emissions from cell phones and cell phone towers.²¹ To date, much of the so-called evidence comes from anecdotes of the sort provided by anti-cell phone activist Debbie Collins, who contended that her daughter's health had significantly improved after she was removed from a school near a cell phone tower. Rejecting expert opinion, Collins stated: "She's a different child now—it's all the proof I need to convince me there is a link between those wretched masts and the health of children" (p. 1). Another mother said, "I needed no more proof than that. This term he started at a new school and I can already see the change in him. His memory has improved and his headaches have gone" (p. 2). Burgess is concerned that a precautionary approach, founded on statements of this kind, will both aggravate fear and impose costs for no good reason.

Burgess's tale begins with a media campaign. In the early 1990s, a number of newspaper stories in the United Kingdom contended, on the basis of little evidence, that mobile phones and base stations were producing harmful health effects. Apparently influenced by these stories, the European Commission in Brussels began an official inquiry in 1995, ultimately funding future research and concluding that adverse effects could not be ruled out. Public fears intensified in 1996 after the issue received attention in a consumer health program on the BBC and a widely read news story in the *Sunday Times* featuring the headline "Mobile phones cook your brain." In 1997, alarmist reports grew in the media, making the claim that cell phones could produce illness and premature mortality (and also reduce sex drives). These reports helped to spur citizen action. By 1999, local political campaigns against cell phone towers became prominent, and they received favorable coverage in local and regional newspapers, which further energized public concern.

These campaigns significantly affected both private and public institutions. The London Metropolitan Police service told its officers to limit cell phones as a "purely precautionary measure" (p. 87). Harrods banned cell phones from its premises. Speaking in explicitly precautionary terms, entrepreneur Richard Branson recommended the use of safety devices for his employees. Local governing councils across the United Kingdom attempted to ban or restrict mobile towers, particularly those near schools. At the national level, the minister for public health legitimated public fears, insisting that in such a context, "it is very im-

21. A different set of issues is raised by the risks associated with use of cell phones while driving. Here there is much stronger evidence of serious hazards. For an overview, see Robert Hahn and James Prieger, "The Impact of Driver Cell Phone Use on Accidents" (July 2004), available at <http://www.aei-brookings.org/publications/abstract.php?pid=806>.

portant that” officials “work very hard to keep ahead of public anxiety” (pp. 88–89). In Burgess’s account, precautionary responses by official institutions helped to fuel that very anxiety. Thus it “is only through being taken seriously by state bodies that the allegations about hypothetical risks have been able to command authority and acquire momentum beyond the immediate reactions of some individuals” (p. 222).

Burgess also makes some interesting and somewhat puzzling remarks about cross-cultural comparisons. In the United Kingdom, there was intense public focus on cell phone risks; similar concerns have been found in Australia, Italy, and South Africa. In Italy, the environment minister established a “green hotline” asking people to state their complaints about “abusive” siting of cell phone towers. The Australian government funded a large-scale research project on potentially adverse health effects. But in the United States, the brief burst of concern in the early 1990s rapidly dissipated, to the point where it is hard to find any serious private or public concern about health risks. And in Finland, no discernible public fear has arisen at all, even though Finland has the highest percentage of cell phone users in the world. (The fact that Nokia is Finland’s biggest company is highly relevant here—a point, bearing on both precautions and CBA, to which I will return.)

Burgess thinks that the cell phone controversy is merely one example of the misuse of precautionary thinking in domains in which scientific evidence fails to support people’s fears. For example, he challenges European skepticism about genetically modified food, describing it as “alarm” (p. 259); and he mounts a broader attack on what he sees as the unhelpful belief that it is wrong to interfere with nature. He is therefore troubled by a wide climate of sensitivity to small risks, especially those that are novel and associated with technological innovation. Precautionary thinking, he believes, helps to create a culture of fear.

III. CATASTROPHE, COSTS, AND BENEFITS

Richard Posner is one of the founders of the economic analysis of law, and he should be expected to be enthusiastic about CBA. In *Catastrophe: Risk and Response*, he does not disappoint that expectation. What makes the book noteworthy is its focus on the application of CBA to truly catastrophic risks—those that might threaten the survival of the human race. Posner covers an extraordinarily wide range of hazards, including genetically modified crops, robotics, and nanotechnology, but he focuses in particular on four: asteroid collisions, particle-accelerator disasters, global warming, and bioterrorism. Posner believes that none of these risks can be dismissed, and he thinks that cost-benefit analysis should be applied to each of them.

Consider, for example, the dangers associated with very powerful particle accelerators. It is extremely unlikely, but not impossible, that

such accelerators will produce a highly compressed object called a “strangelet,” which has the ability to convert whatever it encounters into a new form of matter. Posner quotes Martin Rees, professor of physics at the University of Cambridge, who writes, “A hypothetical strangelet disaster could transform the entire planet Earth into an inert hyperdense sphere about one hundred meters across.”²² Posner accepts the widely held view that a strangelet disaster is exceedingly improbable, but he insists that it cannot be ruled out. As a result, he thinks that nations should at least be willing to ask whether the benefits of very powerful particle accelerators justify incurring the risk. On that question, he is quite doubtful.

Posner’s discussion extends over a wide range. Because my topic is environmental protection, I shall focus on his treatment of global warming.²³ Posner believes that the associated risks should be taken seriously, above all because of the possibility of truly catastrophic harm. He acknowledges that the leading economic expert on global warming, William Nordhaus, estimates its total cost at \$4 trillion—a high figure, to be sure, but hardly astronomical, and one that allows cost-benefit analysis to get off the ground.²⁴ (The United States has an annual GDP of \$10 trillion, and as Posner points out, \$4 trillion represents present value, which might be compared with the present economic value of the United States, which is roughly \$100 trillion.) Nordhaus produces his \$4 trillion figure essentially through the methods that Ackerman and Heinzerling deplore, namely, using WTP and discounting the future.

Posner is concerned not with the objections made by Ackerman and Heinzerling, which he implicitly rejects, but with the possibility that Nordhaus’s estimate greatly understates the problem, above all because of the dangers of abrupt warming, which would be especially destructive. Thus Posner thinks that existing models do not rule out the possibility of (for example) very rapid changes in both temperature and sea levels, the evolution and migration of deadly pests, and even a runaway greenhouse effect, produced by melting of tundras, thus releasing large quantities of additional greenhouse gases. One worst-case scenario is “snowball earth,” covering the world with a layer of ice several kilometers thick, a result of massive increases in cloud cover, preventing sunlight from reaching the earth. Sounding very much like Ackerman and Heinzerling, Posner seeks to draw attention to the worst that might happen.

Many scientists and economists, including Nordhaus, believe that

22. See Martin Rees, *Our Final Hour* (New York: Basic Books, 2003), p. 120.

23. For a general discussion, see Stephen Gardiner, “Ethics and Global Climate Change,” *Ethics* 114 (2004): 555–600.

24. See William Nordhaus and Joseph Boyer, *Warming the World* (Cambridge, Mass.: MIT Press, 2000).

global warming is not likely to create catastrophic harm and that the real costs, human and economic, will be high but not intolerable. In their view, the worst-case scenarios can be responsibly described as improbable.²⁵ Posner disagrees. He believes that “no probabilities can be attached to the catastrophic global-warming scenarios, and without an estimate of probabilities an expected cost cannot be calculated.” In the terms of decision theory, Posner contends that global warming presents a situation of uncertainty, where probabilities cannot be assigned to outcomes, rather than risk, where such probabilities can be assigned.²⁶ In this way, global warming differs from other potentially catastrophic risks that Posner explores, such as the strangelet disaster, which everyone characterizes as exceedingly unlikely.

Posner does not claim that responses to catastrophic risks should be chosen solely by reference to CBA. But he proposes that CBA “is an indispensable step in rational decision making in this as in other areas of government regulation. Effective responses to most catastrophic risks are likely to be extremely costly, and it would be mad to adopt such responses without an effort to estimate the costs and benefits” (p. 139). While favoring CBA, Posner rejects the Precautionary Principle because of its “sponginess” (p. 140). He contends that once that principle becomes sensibly tempered, it turns into a form of CBA with risk aversion, that is, a form of CBA that creates a margin of safety to protect against those dangers that produce special concern. This understanding of the Precautionary Principle, he believes, is perfectly reasonable, but it turns the principle into a version of CBA, not a rival (as Ackerman and Heinzerling claim).

Posner emphasizes that any effort to apply CBA to catastrophic risks requires a great deal of guesswork. Consider the proposal to build a new and very powerful particle accelerator, Brookhaven’s Relativistic Heavy Ion Collider. Posner is concerned about the remote possibility that the Brookhaven collider will destroy the earth; he wants to evaluate the proposal by reference to CBA. He notes that no effort has been made to monetize its benefits, but he ventures a “wild guess” (p. 140) that they amount to \$250 million per year. (It is extremely hard to

25. *Ibid.*, p. 88. Nordhaus suggests a 1.2 percent probability of a catastrophic impact with 2.5° C warming and a 6.8 percent probability with 6° C warming.

26. See Frank H. Knight, *Risk, Uncertainty, and Profit* (Boston: Houghton Mifflin, 1933); Paul Davidson, “Is Probability Theory Relevant for Uncertainty? A Post-Keynesian Perspective,” *Journal of Economic Perspectives* 5 (1991): 129–45. Some people object that uncertainty does not exist, because it is always possible for decision makers to produce probability assignments by proposing a series of lotteries over possible outcomes; but such assignments have no epistemic credentials if unrooted in either theory or repeated experiences, and some environmental problems, plausibly including global warming, are that sort of case.

produce a figure, monetized or nonmonetized, to capture the benefits of basic research; for this reason, Posner's guess is indeed wild.) With that amount, the collider would have a net present value of \$400 million: \$21.1 billion in benefits, assuming a 3 percent discount rate, over a projected ten-year span, minus the accelerator's construction and operating costs, which are \$1.1 billion. But what is the monetized value of the extinction risk? To answer that question, Posner needs to estimate both the probability of extinction and its monetized cost if it comes to fruition. For probability, he ventures a figure of 1 in 10 million, a figure that he also deems "arbitrary," though it is in line with several estimates by expert risk assessors. For monetized cost, based on WTP to reduce statistical risks and a 3 percent discount rate, he values the loss of the human race at \$600 trillion.²⁷ Doing the arithmetic, Posner believes that the net benefits of the Brookhaven collider are negative: -\$100 million. Thus he concludes that the collider should not be built.

Posner acknowledges that "global warming is the poster child for the limitations of cost-benefit analysis" (p. 155). But even here, he thinks that it is possible to make progress by attempting to be as quantitative as possible. Most economists, armed with CBA, oppose the Kyoto Protocol, arguing that its monetized costs probably would exceed its monetized benefits. Recall that the monetized costs of global warming are estimated at around \$4 trillion. For the world as a whole, the monetized benefits of the Kyoto Protocol are estimated at far less than those costs: only \$108 billion.²⁸ The reason is that the protocol would do relatively little about the problem of global warming. Greenhouse gases stay in the atmosphere for a long time, and the Kyoto Protocol would not, of course, affect those emissions that have already occurred. In addition, its provisions do not limit developing nations, which will soon be large sources of greenhouse gases, at all (a primary complaint of the Bush administration); and for the industrialized world, it would merely stabilize emissions modestly below 1990 levels. Hence the benefits of the Kyoto Protocol would be modest, consisting as they would of a mere reduction in the increase of global warming emissions. At the same time, the Kyoto Protocol would impose significant costs on those subject to it, producing a total global cost ranging from \$59 billion to \$884 billion.²⁹ A standard view is that the Kyoto Protocol fails CBA, because

27. To produce this number, Posner values an individual life at only \$50,000, based on an assumption of a very low WTP for tiny risks. He emphasizes that this is a quite conservative assumption and that it would be reasonable to choose higher values.

28. See Nordhaus and Boyer, p. 167.

29. *Ibid.*, p. 156. The low end of the range represents the cost with fully global emissions trading; the high end represents the cost without trading. If trading occurs within the nations listed in an annex to the protocol, the costs are estimated at \$217 billion.

it is likely, in its implementation, to inflict costs in excess of the \$108 billion gains.

Posner thinks this analysis is badly incomplete, because it ignores the possibility that government regulation will force technological innovation, thus producing dramatic decreases in greenhouse gas emissions; and dramatic decreases are necessary to reduce the risk of catastrophe. Posner is particularly interested in the potentially desirable effects of significant taxes on carbon emissions. Such taxes would create economic incentives to develop clean fuels and better methods of carbon sequestration. Posner acknowledges that in view of existing uncertainty and the high costs of emissions controls, it is tempting simply to wait for more scientific information (as the Bush administration has argued). One problem with this approach is that of irreversibility: once greenhouse gases are in the atmosphere, they stay there for a long time. In a key passage, he argues that making “shallower cuts now can be thought of as purchasing an option to enable global warming to be stopped or slowed at some future time at a lower cost” (p. 112).

Posner does not offer a formal CBA for various approaches to the global warming problem. The reason is that his fundamental concern is abrupt warming, to which he believes that no probability can be assigned. In contrast to his quantitative analysis of particle accelerators, his analysis of global warming does not offer many numbers. Indeed, his own form of balancing does not have a transparent structure; his major argument involves the option analysis just described, with the suggestion that current cuts give us the flexibility to reduce warming in the future if that is what we choose to do. He thus argues in favor of aggressive technology-forcing emissions taxes on greenhouse gases, above all to reduce the possibility of catastrophic risk.

IV. PROBLEMS WITH PRECAUTIONS

These three books cover three quite different issues: the idea of precaution, the translation of environmental harms into monetary equivalents, and the appropriate approach to environmental regulation in the face of scientific uncertainty. Let us explore these issues in turn.

Ackerman and Heinzerling argue in favor of the Precautionary Principle. Burgess rejects it as leading to nonsensical outcomes. Posner believes that it must be converted into a form of CBA, one that embodies an aversion to those risks that deserve particular concern. At first glance, it is tempting to say, with Burgess, that the idea of precaution will lead to excessive controls on small or nonexistent risks. It is equally tempting to say, with Posner, that the idea is simply too vague to provide guidance: how much precaution is enough? But the most serious problem lies

elsewhere. In many contexts, the Precautionary Principle is incoherent.³⁰ Risks are often on all sides of a social situation, and risk reduction itself produces risks. Hence the Precautionary Principle, taken for all that it is worth, forbids the very measures that it requires. Ackerman and Heinzerling neglect the fact that regulation can create dangers of its own, in a way that suggests that along some dimensions, many precautions are not precautionary at all. Advocates of precaution often emphasize the costs associated with a product or process, without seeing that it may have benefits as well; and sometimes those benefits involve the environment itself. Why should regulators examine only one side of the ledger?

For example, regulation often gives rise to substitute risks, in the form of hazards that materialize, or are increased, as a result of regulation. Consider the case of DDT, often banned or regulated in the interest of reducing risks to birds and human beings. From the standpoint of the Precautionary Principle, the problem with such bans is that, in poor nations, they eliminate what appears to be the most effective way of combating malaria—and thus significantly undermine public health.³¹ Or consider the United States EPA's effort to ban asbestos, a ban that, on health grounds, might well seem justified or even compelled by the Precautionary Principle. The difficulty, from the standpoint of that very principle, is that substitutes for asbestos also carry risks. The problem is pervasive. The Precautionary Principle is often invoked as a reason for banning genetic modification of food, on the ground that genetic modification creates risks to human health and to the environment. The problem is that genetic modification of food also promises benefits to human health and the environment—and, by eliminating those benefits, regulation itself threatens to run afoul of the Precautionary Principle. When the principle seems to give guidance, it is often because those who use it are focusing on one aspect of risk-related situations and neglecting others.

It is possible to go much further. A great deal of evidence suggests the possibility that an expensive regulation can have adverse effects on life and health.³² It has been urged that a statistical life can be lost for every expenditure of \$7 million;³³ one study suggests that an expenditure

30. I develop this claim in some detail in *Laws of Fear: Beyond the Precautionary Principle* (Cambridge: Cambridge University Press, forthcoming).

31. See Indur Goklany, *The Precautionary Principle* (Washington, D.C.: Cato, 2002).

32. Ralph Keeney, "Mortality Risks Induced by Economic Expenditures," *Risk Analysis* 10 (1990): 147–60; Randall Lutter and John F. Morrall III, "Health-Health Analysis: A New Way to Evaluate Health and Safety Regulation," *Journal of Risk and Uncertainty* 8 (1994): 43–69, p. 49, table 1.

33. See Keeney.

of \$15 million produces a loss of life.³⁴ Another suggests that poor people are especially vulnerable to this effect—that a regulation that reduces wealth for the poorest 20 percent of the population will have twice as large a mortality effect as a regulation that reduces wealth for the wealthiest 20 percent.³⁵ If poor people are paying a significant amount for modest environmental benefits, their health might be made worse rather than better. To be sure, both the phenomenon and the underlying mechanisms are reasonably disputed (and Ackerman and Heinzerling reasonably dispute it).³⁶ For purposes of applying the Precautionary Principle, the only point is that sensible people believe in that association. It follows that a multimillion dollar expenditure for “precaution” has—as a worst case scenario—significant adverse health effects, with an expenditure of \$200 million possibly leading to perhaps as many as twenty lives lost.

This point makes the Precautionary Principle hard to implement not merely where regulation introduces or increases substitute risks but in any case in which the regulation costs a significant amount. If this is so, the Precautionary Principle, for that very reason, raises doubts about many regulations. If the principle argues against any action that carries a small risk of imposing significant harm, then we should be reluctant to spend a great deal of money to reduce risks, simply because those expenditures themselves carry risks. Here is the sense in which the Precautionary Principle, taken for all that it is worth, is paralyzing: it stands as an obstacle to regulation and nonregulation, and to everything in between.³⁷

Ackerman and Heinzerling do not sufficiently appreciate this point. They neglect the possibility that expensive regulation will actually hurt real people. Consider their seemingly offhand remark about protection against workplace hazards: the “costs of the regulation would probably be borne by the employers who would be required to maintain safer workplaces” (p. 193). But the costs of regulation are often borne not only by employers but also by consumers, whose prices increase, and by workers, who might find fewer and less remunerative jobs. When government imposes large costs on “polluters,” consumers and workers are likely to pay part of the bill. And if prices increase, some risks will

34. See Robert W. Hahn et al., *Do Federal Regulations Reduce Mortality?* (Washington, D.C.: American Enterprise Institute, 2000).

35. See Kenneth S. Chapman and Govind Hariharan, “Do Poor People Have a Stronger Relationship between Income and Mortality than the Rich? Implications of Panel Data for Health-Health Analysis,” *Journal of Risk and Uncertainty* 12 (1996): 51, 58–63.

36. See Lutter and Morrall.

37. Posner’s distinctive concern involves catastrophic harms with a threat of extinction; here, of course, no equally serious risk is likely to be on the other side. I return to this point in the discussion of maximin below.

increase as well. To be sure, some environmental regulations do increase employment and decrease prices. But as a general rule, there is no reason to believe that regulatory imposition of high costs will benefit workers and consumers; the opposite is more likely to be true.

In the context of cell phones, this point helps illuminate a quite remarkable fact, one to which Burgess gives too little attention. Notwithstanding the popularity of precautionary thinking, and the apparent intensity of public fears, those fears did not, in fact, produce large-scale controls on either phones or towers. Burgess offers no explanation of why such controls did not materialize, but his brief discussion of Finland provides a useful clue. Is it really a paradox, or an irony, that fears of cell phones were especially weak in a nation that has the largest percentage of cell phone users in the world? I do not believe so. The Finnish economy is heavily dependent on Nokia and thus the cell phone industry; people in Finland do not want the Finnish economy to collapse. And if most citizens depend on cell phones, they are far less likely to accept sensationalistic claims of risk, simply because they have so much to lose from regulation. (Imagine, by way of comparison, the likely public reaction to a current suggestion by an American politician that cell phones should be banned because they pose a cancer risk.) If the benefits of cell phone use are evident to all or most, then people will demand a great deal of evidence that the harm is real. In short, the very idea of precaution loses some of its appeal when people are aware that precaution imposes costs and even risks of its own.³⁸ When people are aware of that fact, some kind of balancing, involving both costs and benefits, is likely to emerge.

In a brief but illuminating discussion of another environmental issue, Burgess strongly supports the general point. He refers to a mining town in Colorado whose citizens were deemed, by the EPA, to be at risk from toxic contamination. The town's citizens, already suffering from serious economic decline, responded not with fear—and much less with enthusiasm for a precautionary approach—but by demonizing the EPA, which it regarded as “the devil incarnate. Grimly they recounted how government bureaucrats had invaded their town uninvited, threatening residents with the prospect of condemned property, involuntary relocation, and unwelcome new legal requirements. . . . And all, they claimed, over a hazard ‘that doesn’t exist’” (p. 272). Far from succumbing to panic, citizens of the mining town were well aware of how much they had to lose from aggressive regulation; hence they sought to dismiss real evidence of harm. Precautions and precautionary thinking seem far less attractive when people believe that precautions would produce significant costs and risks.

38. See the treatment of fungibility in Margolis.

Burgess does not draw attention to one of the remarkable lessons of his story, which is that the cell phone scare did not produce aggressive regulation not only because the evidence of harm was weak but also and still more fundamentally because a growing number of people use cell phones and would be inconvenienced, or far worse, by such measures. (Consider the fact that cell phones are often used to obtain help in emergency situations.) In the context of genetically modified food, by contrast, the costs of regulation are not highly visible, at least not to Europeans. Precautionary thinking, in short, is most appealing when the costs and burdens of precautions are not visible. When both costs and benefits are on the public viewscreen, people become intuitive cost-benefit analysts, and they tend to be cautious about precautions—unless the evidence in their favor is strong. This point brings us directly to the questions raised by CBA.

V. COSTS AND BENEFITS

As Ackerman and Heinzerling stress, some of the most difficult questions for CBA involve the translation of risks into monetary equivalents. Recall that under current practice, the monetary values come mostly from real-world markets, producing evidence of compensation levels for actual risks. It is important to see that in basing CBA on calculations of this kind, regulators are not, in fact, producing a “value of a statistical life.” In fact they are not “valuing life” at all. They are not saying that the average American would pay \$6 million to avoid death, or that a human life is, in some metaphysical sense, worth that amount. Instead they are generating numbers that reflect the market value of statistical risks. Typically agencies are dealing with low-level risks, on the order of 1/100,000, and when they “value a life” at \$6 million, they are really saying that the evidence suggests that people must be paid \$60 to be subject to a risk of that magnitude—and that government will build on that evidence in making regulatory decisions.

A. *The Argument for WTP*

Ackerman and Heinzerling think that this practice is a form of madness, and hence they do not pause to ask why regulators in a democratic society might care about market valuations of statistical risks. But there are two possible answers, both connected with individual choice, and both growing directly out of prominent strands in liberal theory. The first involves welfare; the second involves autonomy.

To clarify the point, assume a society in which people face multiple risks of 1/100,000 and in which every person is both adequately informed and willing to pay no more and no less than \$60 to eliminate each of those risks. Assume too that the cost of eliminating these 1/100,000 risks is widely variable, ranging from close to zero to hundreds

of millions of dollars. Assume finally that the cost of eliminating any risk is borne entirely by those who benefit from risk elimination. Under that assumption, regulation imposes the equivalent of a user's fee; for example, people's water bills will entirely reflect the costs of a policy that eliminates a 1/100,000 of getting cancer from arsenic in drinking water. If the per-person cost is \$100, each water bill will be increased by exactly that amount.

At first glance, use of WTP, under the stated assumptions, is easy to defend. Why should people be forced to pay an amount for regulation that exceeds their WTP? Of course we might believe that a measure of redistribution is appropriate—that private sources, or government, should provide people with regulatory protection for free. But regulation need not, and often does not, amount to a subsidy to those who benefit from it. After the enactment of workers' compensation regulation, nonunionized workers faced a dollar-for-dollar wage reduction, corresponding almost perfectly to the expected value of the benefits they received.³⁹ For drinking water regulation, something similar is involved. The cost of regulations is passed onto consumers in the form of higher water bills.⁴⁰

More particularly, those who are interested in welfare will insist on the relevance of WTP under the stated assumptions.⁴¹ If people are willing to pay \$60, but no more, to eliminate a risk of 1/100,000, then we have good reason to think that their welfare is increased by asking them to pay that amount—and that their welfare is decreased by asking them to pay more. There are many demands on people's budgets, and if they refuse to spend more than \$60 on a 1/100,000 risk, it may be because they would like to use their money for food, shelter, recreation, education, or any number of other goods. Regulation can operate as a forced exchange and, by hypothesis, a forced exchange on terms that people dislike will make them worse off.⁴²

For purposes of evaluating regulation, it does not matter if the existing distribution of income is unjust or if poor people are, in an intelligible sense, coerced to run certain risks. The remedy for unjust

39. Price Fishback and Shawn Everett Kantor, *A Prelude to the Welfare State* (Chicago: University of Chicago Press, 1998).

40. See Sunstein, "The Arithmetic of Arsenic."

41. See Gibbard, p. 97, for a valuable discussion of how CBA might be taken as "a rough surrogate for expected total intrinsic-reward maximization." To the same general effect, for defenses of CBA on welfare grounds, see Matthew Adler and Eric A. Posner, "Implementing Cost-Benefit Analysis When Preferences Are Distorted," *Journal of Legal Studies* 29 (2000): 1105-45; Matthew Adler and Eric A. Posner, "Rethinking Cost-Benefit Analysis," *Yale Law Journal* 109 (1999): 167-246.

42. As we shall see, it matters a great deal whether it actually so operates; I explore this issue in detail below.

distributions, and for that form of coercion, is not to require people to buy regulatory benefits on terms that they find unacceptable. Suppose that people are willing to pay only \$60 to eliminate a 1/100,000 risk because they are not rich and that, if they had twice their current wealth, they would be willing to pay \$120. Even if this is so, government does people no favors by forcing them to pay the amount that they would pay if they had more money. In ridiculing WTP, Ackerman and Heinzerling devote too little attention to this point.

If we reject the argument from welfare, we might nonetheless rely on WTP on grounds of personal autonomy.⁴³ On this view, people should be sovereign over their own lives, and this principle means that government should respect personal choices about how to use limited resources (again so long as those choices are adequately informed). When people decline to devote more than \$60 to eliminate a 1/100,000 risk, it is because they would prefer to spend the money in a way that seems to them more desirable. If regulators reject people's actual judgments, then they are insulting their dignity. The use of WTP therefore can claim a simultaneous defense from both utilitarian and deontological considerations.

When the assumptions just outlined are met, we have what might be described as easy cases for the use of the WTP criterion. Some people contend that money and health are incommensurable—that our reflective judgments do not permit us to line up dollars and health risks along a single metric.⁴⁴ Suppose that this is so. To see the easy cases as such, it is not necessary to make controversial arguments about commensurability or to venture into controversial philosophical territory. The underlying claim is a simple pragmatic one, to the effect that people are willing to trade money against decreases in statistical risks. If people actually make those trades, then government might well build on their practices in designing policies.

B. Objections

There are several possible objections. Perhaps the most obvious would point to people's rights. On one view, people have a right not to be subjected to risks of a certain magnitude, and the use of WTP will violate that right. In fact it is fully reasonable to say that, whatever their WTP, human beings have a right not to be subject to risks above a particular level. Imagine, for example, that poor people live in a place where they face a 1/20 annual risk of dying from water pollution; it makes sense

43. See Ronald Dworkin, *Sovereign Virtue* (Cambridge, Mass.: Harvard University Press, 2002).

44. See Elizabeth Anderson, *Value in Ethics and in Economics* (Cambridge, Mass.: Harvard University Press, 1994).

to say that the government is required to reduce that risk even if people are willing to pay only \$1 to eliminate it and the per-person cost is \$5. The only qualification is that, in practice, rights are resource dependent. What rights people are able to claim, against their government, is a product of the amount of available money, and hence people's legitimate arguments for protection are inevitably affected by the level of resources in the society. But let us simply assume here that risks above a certain level should count as violative of rights.

It might be added that people have a right not to be subjected to the intentional or reckless imposition of harm, whatever their WTP. If a company subjects the citizens of a town to a high danger, and it does so maliciously or without the slightest concern for their welfare, the rights of those citizens have been violated, even if their WTP is low. Indeed, some such systems impose strict liability for harms.

As abstract claims about people's rights, these objections are entirely plausible. Something has gone badly wrong if people are exposed to serious risks and if their low WTP prevents them from doing anything in response. Things are even worse if government uses their low WTP to justify inaction in the face of those risks. It would be ludicrous to suggest that WTP is determinative of the appropriate use of government subsidies; a redistributive policy hardly tracks people's WTP. (Would it make sense to say that government will give poor people a check for \$100 only if they are willing to pay \$100 for that check?)

In many cases of environmental regulation, however, rights violations are not involved; we are speaking here of statistically small risks. Even if rights are involved when people are subject to small risks, people should be permitted to waive those rights at an agreeable price (at least on the assumptions that I am making). The proper response to an apparent rights violation is not to force people to buy protection that they do not want but to provide a subsidy that will give them the benefit for free or enable them to receive the benefit at what is, for them, an acceptable price. But regulation—and this is the key point—often does no such thing; and for the easy cases, the question is one of regulation under the stated assumptions. So long as that is the question, use of WTP does not violate anyone's rights.

What about environmental wrongdoers? If a company has intentionally, recklessly, or negligently exposed people to harm, it should be held accountable through the payment of damages, even if the WTP of the affected population is low. It is possible for the tort system to go much further. A sensible legal system might well choose to force companies to internalize the costs of their activities by requiring them to pay for the harms they have caused, even if there has been neither intentional nor negligent wrongdoing. Within tort theory, there is an active debate on this question, and it is possible to support strict liability

by reference to a range of theoretical positions.⁴⁵ But the subject here is regulation, not compensation via the tort system. It would be odd to say that people have a right to be required to pay more for risk reduction than they are willing to pay, at least if they are adequately informed. If people are willing to pay only \$25 to eliminate a risk of 1/100,000, a reference to their rights cannot plausibly justify the conclusion that government should impose a regulation that costs them \$75.

An independent objection would stress, as Ackerman and Heinzerling do, that people are citizens, not merely consumers. On this view, regulatory choices should be made, not after aggregating WTP, but after citizens have deliberated with one another about their preferences and values. The argument against forced exchanges treats people as consumers; it sees their decisions about safety as the same as their decisions about all other commodities. For some decisions, this approach is badly misconceived. The American constitutional system is a deliberative democracy, not a maximization machine, and many social judgments should be made by citizens engaged in deliberative discussion with one another rather than by aggregating the individual choices of consumers.⁴⁶

In the context of racial and sex discrimination, for example, sensible societies do not aggregate people's WTP. The level of permissible discrimination is not set by using market evidence to see how much people would be willing to pay to discriminate (or to be free from discrimination). Even if discriminatory employers would be willing to pay a great deal to avoid associating with members of unpopular groups, such discrimination is banned. Nor is the protection of endangered species chosen on the basis of aggregated WTP. Whether and when to protect members of endangered species is a moral question to be resolved through democratic discussion, not through exercises in consumer sovereignty. In many environmental contexts, use of WTP would wrongly see people as consumers, purchasing products, rather than as citizens, deliberating about values. Speaking in this vein, Amartya Sen emphasizes that "discussions and exchange, and even political arguments, contribute to the formation and revision of values."⁴⁷ He urges that, in the particular context of environmental protection, solutions require us "to go beyond looking only for the best reflection of existing

45. See Richard A. Epstein, "A Theory of Strict Liability," *Journal of Legal Studies* 2 (1973): 151–82; Richard Posner, *Economic Analysis of Law*, 4th ed. (New York: Aspen, 1992), pp. 175–82.

46. See William Bessette, *The Mild Voice of Reason* (Chicago: University of Chicago Press, 1992).

47. Amartya Sen, *Rationality and Freedom* (Cambridge, Mass.: Harvard University Press, 2001), p. 287.

individual preferences, or the most acceptable procedures for choices based on those preferences.”⁴⁸

Sen’s claims identify some serious limitations on the use of WTP. But such objections should not be read for more than they are worth. In trading off safety and health in our own private lives, we do not have static values and preferences. Much of the time, our choices are a product of reflection, even if we are simply acting as consumers. To be sure, moral questions are not to be resolved by aggregating private WTP. Some preferences, even though backed by WTP, are morally off-limits, and policy should not take account of them. In addition, many people are unwilling to pay a great deal for goods that have strong moral justifications; animal welfare is an example. In these circumstances, the market model is inapplicable, and WTP tells us very little.

But what about the easy cases? Do these arguments suggest that government should override individual choices about how much to spend to eliminate low-level risks, even when those choices are adequately informed? For environmental protection generally, it is indeed important to go beyond “the best reflection of existing individual preferences.” But this point does not establish that people should be required to pay (for example) \$100 to eliminate mortality risks of 1/100,000 when they are willing to pay only \$75. If people’s WTP reflects impulsiveness, recklessness, an absence of information, or insufficient deliberation, then it is important for other people, in government as elsewhere, to draw their attention to that fact. And in some cases, a low WTP might be overridden on the ground that it is rooted in errors, factual or otherwise. But these points should be taken neither as a general objection to my conclusion about the easy cases nor to suggest that government should force people to reduce statistical risks at an expense that they deem excessive.

A final objection would emphasize the possibility that people’s preferences have adapted to limitations in existing opportunities, including deprivation.⁴⁹ Perhaps people show a low WTP for environmental goods, including health improvements, simply because they have adjusted to environmental bads, including health risks. Perhaps people’s WTP reflects an effort to reduce cognitive dissonance through the conclusion that risks are lower than they actually are.⁵⁰ To generalize the objection, perhaps people suffer from a problem of “miswanting”; they want things that do not promote their welfare, and they do not want things that

48. *Ibid.*, p. 289.

49. See Jon Elster, *Sour Grapes* (Cambridge: Cambridge University Press, 1983); Martha Nussbaum, *Women and Human Development* (Cambridge: Cambridge University Press, 2001).

50. See George A. Akerlof, *An Economic Theorist’s Book of Tales* (Cambridge: Cambridge University Press, 1984), pp. 123–37.

would promote their welfare.⁵¹ If this is so, then WTP loses much of its underlying justification; people's decisions do not actually promote their welfare, and their autonomy, properly understood, may not require respect for their decisions, which may be nonautonomous.⁵² In other words, the idea of autonomy requires not merely respect for whatever preferences people happen to have, but also social conditions that allow preferences to be developed in a way that does not reflect coercion or injustice. With respect to some risks, the relevant preferences are non-autonomous; consider the fact that many women face a risk of male violence under circumstances in which they believe that little can be done and hence adapt. If government can be confident that people are not willing to pay for goods from which they would greatly benefit, government should probably abandon WTP.

In the context of ordinary regulatory policy, however, this objection has more theoretical than practical interest. Typically we are speaking of steps that would reduce low-level mortality risks (say, 1/50,000). Much of the time, there is no reason to believe that the use of informed WTP (say, \$100) is a product of adaptive preferences. When there is such a reason, the judgment about the easy cases must be revised.

C. Harder Cases

There is an obvious artificiality in the assumptions behind the easy cases. Most important, people do not always bear the full social costs of the regulatory benefits they receive. Sometimes they pay only a fraction of those costs—or possibly even nothing at all. When this is so, the analysis is much more complicated. In the context of air pollution regulation, for example, there is a complex set of distributional effects, and, on balance, poor people and members of minority communities appear to be net gainers.⁵³ A CBA, based on WTP, might not produce an adequate account of the welfare effects of air pollution regulation.⁵⁴ And even if it does, an account of welfare effects would not end the normative question, because the distributional gains are important to consider.

Suppose, for example, that beneficiaries of a proposed drinking water regulation are willing to pay only \$80 to eliminate a risk of 1/

51. Daniel T. Gilbert and T. D. Wilson, "Miswanting," in *Thinking and Feeling: The Role of Affect in Social Cognition*, ed. Joseph P. Forgas (Cambridge: Cambridge University Press, 2000), pp. 178-92; Timothy D. Wilson and Daniel T. Gilbert, "Affective Forecasting, Advances in Experimental Social Psychology," June 2003, at p. 345.

52. For general discussion, see Daniel Kahneman, Peter P. Wakker, and Rakesh Sarin, "Back to Bentham? Explorations of Experienced Utility," *Quarterly Journal of Economics* 112 (1997): 375-405, pp. 375, 379-80.

53. See Matthew E. Kahn, "The Beneficiaries of Clean Air Act Regulation," *Regulation* 24 (2001): 34-37.

54. On the relationship between welfare and CBA, see Gibbard; Adler and Posner.

50,000 in drinking water, that the per-person cost of eliminating a 1/50,000 risk is \$100, but that, for every dollar of that cost, the beneficiaries pay only 70 cents. The remaining 30 cents might be paid by water companies themselves, in the form of reduced profits, or by employees of the water companies, in the form of reduced wages and fewer jobs. In this example, the costs of the regulation exceed the benefits; it is inefficient. But, by hypothesis, the regulation makes its beneficiaries of the regulation better off. If CBA provides the rule of decision, and if the WTP criterion is used, the fact that the monetized costs exceed the monetized benefits is decisive. But as a normative matter, the analysis here is far harder than in the easy cases. On what assumption should the WTP numbers be decisive?

The assumption must be that economic efficiency is the goal of government, at least in the context of environmental regulation—that in order to know what to do, we should aggregate the benefits and costs of regulation, and act if and only if the benefits exceed the costs. When using the WTP numbers, government is acting as a maximization machine, aggregating all benefits and costs as measured by the WTP criterion. But this is an implausible understanding of what government should be doing. In fact, it represents a shift from the relatively uncontroversial Pareto criterion, exemplified in the easy cases, to a version of the far more controversial Kaldor-Hicks criterion, which assesses policy by asking this question: are the gainers winning more than the losers are losing?⁵⁵ The Kaldor-Hicks criterion is sometimes described as potential Pareto superiority, because it asks whether, in principle, the winners could compensate the losers and a surplus could be left over. The difficulty of course is that Pareto superiority is merely potential. Some people really are losing and others are gaining.

In the harder cases, the gainers are gaining less (in monetary terms) than the losers are losing—and hence CBA suggests that regulation is unjustified. Under the assumptions I have given, the regulation is indeed inefficient: its social cost is higher than its social benefit. But is the regulation undesirable? This is not at all clear. The first problem is that WTP is measuring gains and losses in monetary terms, rather than in welfare terms. It is possible that those who gain, in the harder cases, are gaining more welfare than the losers lose; WTP is not dispositive on that question.⁵⁶ The second problem is distributional. Suppose that in terms of overall welfare, the regulation is not desirable; it makes

55. It is only a version of that criterion, because it is measuring welfare in monetary equivalents. A direct assessment of welfare, if it were possible, might show that the regulation in question is justified under the Kaldor-Hicks criterion.

56. On CBA and welfare, and for a welfarist defense of CBA as a decision procedure, see Adler and Posner.

aggregate welfare lower rather than higher. But suppose too that those who benefit are poorer and more disadvantaged than those who lose. If, for example, those who are willing to pay \$80 are disproportionately poor, and those who pay the remainder are disproportionately wealthy, the regulation might be plausibly justified despite the welfare loss.

It is natural to respond here that if redistribution is what is sought, then it should be produced not through regulation but through the tax system, which is a more efficient way of transferring resources to those who need help.⁵⁷ But suppose that redistribution is not going to happen through the tax system. If so, then the regulation in the harder cases cannot be ruled off-limits despite its inefficiency. The fact that a regulation is helpful to the most disadvantaged is not decisive in its favor. If it is trivially helpful, and if it inflicts huge costs on everyone else, little can be said for it. But everything depends on the magnitude of the relevant effects. A program that produces large gains for the least well-off would seem to be justified even if it imposes, in terms of WTP, slightly higher costs than benefits on balance.

The simple conclusion is that the argument for using WTP is most plausible in cases in which the beneficiaries of regulation pay all or most of its cost. In such cases, WTP is reasonably used so long as people are adequately informed and so long as the question is how much they should be forced to spend to avoid existing risks. The analysis must be different when the beneficiaries of regulation are paying only a small fraction of its costs. In such cases, it is possible that the regulation can be justified as a redistributive measure or on welfare grounds. To know whether it can be so justified, it is necessary to go beyond CBA and to identify the winners and losers.⁵⁸ Ackerman and Heinzerling neglect to distinguish between the easy cases and the harder ones and thus fail to appreciate the arguments that lie behind use of WTP.

D. On Individuation and Discount Rates

Many of the most interesting arguments offered by Ackerman and Heinzerling are best seen as attacks on CBA as currently practiced, not on CBA as such. Consider, for example, their suggestion that it is foolish to extrapolate, from workplace studies, a single figure for the value of

57. See, e.g., Louis Kaplow and Steven Shavell, "Why the Legal System Is Less Efficient Than the Income Tax in Redistributing Income," *Journal of Legal Studies* 23 (1994): 667–81, p. 667.

58. A possible defense of CBA would be that individualized identification of winners and losers would be extremely difficult, that agencies would not make defensible distributional judgments, and that CBA works better, on balance, than any approach that attempts to make finer distinctions. A great deal of empirical work would be necessary to make this defense convincing. My goal here is to sort out the theoretical issues; CBA might look especially good, or especially bad, when we investigate empirical issues as well.

statistical risks. Ackerman and Heinzerling note that people care not only about the magnitude of the risk (is it 1/10,000 or 1/100,000?) but also about its nature and context. A risk of death from cancer might well be worse than a statistically equivalent risk of a sudden, unanticipated death. A risk of death from air pollution, or drinking water, might well produce a higher WTP than a statistically equivalent risk of death from a workplace accident.

This claim is plausible, but it is most sensibly taken as an argument for a more refined version of CBA, one that insists on variations among statistically equivalent risks.⁵⁹ A single number is genuinely obtuse; in fact it is inconsistent with the very theory that gives rise to the use of WTP in the first place. Recall that if WTP is relevant, it is because its use promotes welfare, autonomy, or both. If this is so, regulators should consult actual WTP, which varies across risks, rather than a single or unitary WTP, which grows only out of one set of risks, and which (as Ackerman and Heinzerling say) cannot plausibly be applied to every risk of a given statistical magnitude. The real question is not whether to have more differentiated monetary values for qualitatively identical risks but where to find reliable evidence on which to base those values. Economists are starting to fill the relevant gaps, in a way that supports the suggestion that a single WTP is far too crude.⁶⁰ It would not be difficult to continue to use WTP and to take account of the fact that it varies across risks, even if they are statistically identical.

Ackerman and Heinzerling also object, plausibly, to the application of the standard discount rate for money to the valuation of future gains in terms of both mortality and morbidity.⁶¹ But suppose that no discount rate is appropriate—that deaths in 2050 should be valued the same way as deaths in 2010. If so, the analysis of costs and benefits would not be the same; but it would remain possible to calculate both costs and benefits. In any case, the analysis of discounting must make a distinction to which Ackerman and Heinzerling devote insufficient attention.⁶² Sometimes environmental regulation protects living people from latent harms—risks that will come to fruition not now, but ten, twenty, or thirty years from now. It seems clear that some discount rate should be applied to latent harms. Most people, intuitively and on reflection, would much

59. I develop this point in *Laws of Fear*.

60. *Ibid.*

61. See Tyler Cowen and Derek Parfit, "Against the Social Discount Rate," in *Justice between Age Groups and Generations*, ed. Peter Laslett and James S. Fishkin (New Haven, Conn.: Yale University Press, 1992), pp. 144–45.

62. See the illuminating discussion in Richard L. Revesz, "Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives," *Columbia Law Review* 99 (1999): 941, 962–74.

prefer to face a harm in the future rather than immediately.⁶³ Hence some kind of discount rate makes a great deal of sense for harms that will not come to fruition for a long time (even if the discount rate for such harms does not turn out to be the same as the discount rate for money). But sometimes environmental regulation protects members of future generations; and this is a quite different problem. If a program would save one hundred people born in 2020, it is not clear that it deserves less enthusiasm than a program that would save one hundred people born in 2002.

At the same time, a refusal to use a discount rate creates a number of logical and practical conundrums, especially if it would impose high costs on current generations—a particular problem in light of the fact that if current generations face high costs, posterity is likely to be hurt too. Hence aggressive regulation, at least if it is extremely costly, may not help future generations at all. In any case, future generations are almost inevitably going to be wealthier than our own; should the relatively poor present redistribute resources to the relatively rich future? It has also been argued that if regulators are indifferent as to lives saved now or in the future, but discount costs at some positive rate, then it makes sense for them to delay life-saving expenditures indefinitely.⁶⁴ In any case, it has been suggested that instead of discounting lives, regulators might simply use the future discounted (monetary) cost of saving lives at the time when lives are saved—an approach that is mathematically identical and hence produces the same analysis.⁶⁵

I cannot resolve here the complex questions raised by individuation of WTP and by discount rates.⁶⁶ Ackerman and Heinzerling are right

63. It is difficult to separate, in practice, the fact that people would prefer more life-years rather than fewer from the fact that people would prefer a distant death rather than an immediate one. If most people would much prefer a fatal illness in 2050 to a fatal illness in 2010, there may be no discounting; the choice might be based on the fact that the later date ensures more life-years. The question of morbidity presents a simpler test of discounting: most people would rather have a month of illness in 2010 than a month of illness in 2005.

64. Emmett B. Keeler and Shan Cretin, "Discounting of Life-Saving and Other Non-monetary Effects," *Management Science* 29 (1983): 300–318. Ackerman and Heinzerling discuss this claim and reject it (pp. 193–94), in part on the ground that allowing numerous current deaths would be politically unacceptable; but the claim is one of the logical implication of refusing to discount, and the fact that it entails a politically unacceptable outcome does not mean that it is wrong.

65. See Morrall, "Saving Lives." Note that many people believe that because of technological advances, future risks are unlikely to come to fruition, simply because new technologies will permit us to prevent them. This is not, however, a point about discounting itself.

66. An especially good discussion is found in Revesz.

to raise questions about existing practice.⁶⁷ It seems clear that greater individuation is justified for statistically equivalent risks that people consider to be qualitatively different; it also seems clear that a discount rate should be used for latent harms. The appropriate approach to risks faced by future generations remains unsettled. The simplest point is that if these questions are properly answered, CBA will be mended, not ended.

VI. UNCERTAINTY, CATASTROPHE, AND MAXIMIN

Thus far I have emphasized issues of monetization, as highlighted by Ackerman and Heinzerling. But as Posner's discussion demonstrates, some of the most interesting problems raised by CBA have nothing to do with the translation of risks into monetary equivalents. Recall that Posner's assessment of the risks of particle accelerators contains what he himself describes as arbitrariness. Nor is the problem limited to unconventional problems of this kind. Consider a fairly mundane issue under the Safe Drinking Water Act. If government reduces permissible levels of arsenic in drinking water from 50 parts per billion (ppb) to 10 ppb, what, exactly, are the expected benefits? On the basis of existing evidence, many answers are scientifically respectable.⁶⁸ For a regulation mandating that reduction, the EPA estimated that it would prevent about twenty-five premature deaths and roughly an equivalent number of non-fatal cancer cases. But on the basis of the same inconclusive evidence that was before the EPA, it would have been reasonable to project that the regulation would prevent as few as six deaths or as many as 110. The evidence suggested a range, not a specific estimate.

As a result, critics of CBA might contend the method gives only the illusion of precision. Even before deaths are translated into monetary equivalents, regulators might well be required to make judgments of value, not merely fact, in projecting the likely effects of regulatory protection. But this point should not be read for more than it is worth. When specific estimates are not feasible, the evidence often permits agencies to specify a range. For the arsenic rule, they could say, for example, that a 10 ppb standard is likely to prevent a minimum of six and a maximum of 110 deaths, and they might undertake CBA with reference to the range. Such an analysis would not resolve the question of what to do, but it would greatly discipline the inquiry.

In some circumstances, however, existing information puts regu-

67. They are also right to contend that regulators should consider not only the WTP of those who face mortality risks, but also that of others who care about them. See Eric A. Posner and Cass R. Sunstein, "Dollars and Death," *University of Chicago Law Review* (forthcoming).

68. See Sunstein, "The Arithmetic of Arsenic."

lators in a far more difficult situation. These are cases of genuine uncertainty, in which probabilities cannot be assigned to the expected outcomes. Posner is much concerned with these situations. While he does not spell out the argument, his treatment of catastrophic risks points to a promising possibility for a narrower, and more appealing, version of the Precautionary Principle, a kind of Anti-Catastrophe Principle. Suppose that citizens face catastrophic risks to which probabilities cannot be assigned; suppose, that is, that they are operating under conditions of uncertainty rather than risk. If regulators are operating under such conditions, they might well do best to follow maximin, identifying the worst-case scenarios and choosing the approach that eliminates the worst of these. It follows that, if aggressive measures are justified to reduce the risks associated with global warming, one reason is that those risks are potentially catastrophic and existing science does not enable us to assign probabilities to the worst-case scenarios. Maximin is an appealing decision rule whenever uncertainty is present, but in the regulatory context, it is particularly important for extremely bad outcomes. When Ackerman and Heinzerling suggest the value of focusing on the worst case, they are offering unfortunate advice under circumstances of risk; but if they are understood to be speaking of uncertainty, they are on much firmer ground (see pp. 225–26).

In an extremely illuminating effort to recast the Precautionary Principle,⁶⁹ Stephen Gardiner adapts John Rawls's argument that when "grave risks" are involved, and when probabilities cannot be assigned to the occurrence of those risks, maximin is the appropriate decision rule, at least if the chooser "cares very little, if anything, for what he might gain among the minimum stipend that he can, in fact, be sure of by following the maximin rule."⁷⁰ Applying Rawls's claims about the original position and distributive justice to the environmental setting, Gardiner urges that maximin, and hence a "core" Precautionary Principle, is justified (1) in the face of potentially catastrophic outcomes, (2) where probabilities cannot be assigned, and (3) when the loss, from following maximin, is a matter of relative indifference. Gardiner adds, sensibly, that to justify maximin, the threats that are potentially catastrophic must satisfy some minimal threshold of plausibility. If they can be dismissed as unrealistic, then maximin should not be followed. Gardiner believes that the problem of global warming can be usefully an-

69. See Stephen Gardiner, "A Core Precautionary Principle" (unpublished manuscript, University of Washington, 2004).

70. See John Rawls, *A Theory of Justice* (Cambridge: Harvard University Press, revised edition 1999), p. 134. Rawls draws in turn on William Fellner, *Probability and Profit* (Homewood, Ill.: Irwin, 1965).

alyzed in these terms and that it presents a good case for the application of maximin.

This argument seems to me on the right track, but its conclusion, as stated, risks triviality, above all because of condition 3. If individuals and societies can eliminate an uncertain danger of catastrophe for essentially no cost, then of course they should eliminate that risk. But the real world rarely presents problems of this form. In real disputes, the elimination of uncertain dangers of catastrophe imposes both costs and risks. In the context of global warming, for example, it is implausible to say that regulatory choosers can or should care “very little, if anything,” for what might be lost by following maximin. If we followed maximin for global warming, we would spend a great deal to reduce greenhouse gas emissions, and the result would almost certainly be higher prices for gasoline and energy, probably producing increases in unemployment and poverty.

For environmental problems, does Gardiner’s argument for maximin provide help beyond the trivial cases? I believe that, if properly reformulated, it does, for one simple reason: condition 3 is too stringent and should be abandoned. Even if the costs of following maximin are significant, and even if choosers care a great deal about incurring those costs, it makes sense to follow maximin when they face uncertain dangers of catastrophe. The hardest question here is: under circumstances of uncertainty, how much cost does it make sense to incur in the service of maximin? Consider a straightforward case: the catastrophic dangers associated with global warming could be eliminated if every nation contributed \$2 million to a fund to combat that risk. Surely that cost would be acceptable. Consider a very different case: the catastrophic dangers associated with global warming could be eliminated only if every nation contributed enough resources to reduce standards of living by 50 percent world-wide, with a corresponding increase in global poverty. If global warming really does pose an uncertain danger of total catastrophe, the logic of maximin argues in favor of this extraordinary reduction in world-wide standards of living; but it is not clear that following that logic would be reasonable. To incur costs of this magnitude, we might want to insist that the danger of catastrophe rises above a minimal threshold—that there be demonstrable probability, and a not-so-low one, that the catastrophic risk will occur. It would seem far more sensible to take less costly steps now and to engage in further research, attempting to learn enough to know more about the probability that the catastrophic outcomes will occur.⁷¹

71. Sometimes the Precautionary Principle is urged in situations in which one or another course seems irreversible; and Posner attends to issues of reversibility in discussing global warming. But the issue of irreversibility raises many problems. Any death, of any

For global warming, Posner's interesting recommendations seem vulnerable for this reason. Though a firm defender of quantification, he offers too little in the way of numbers here. To evaluate his proposal for new taxes on greenhouse gas emissions, designed to produce technological innovation, it would be valuable to know both the costs of that initiative and the likely benefits. Assessment of costs would not be easy, because we cannot project the rate of technological innovation; but if the taxes are significant, large increases should be expected in the price of energy, including gasoline, with particularly serious effects on poor people. Because of the range of uncertainties in the science of global warming, assessment of benefits is even harder. But at the very least, it should be possible to measure the likely effects of such taxes on greenhouse gas emissions. If the relevant taxes can be projected to spur significant reductions, then the argument for them is certainly strengthened.

Unlike Posner, I suspect that the likelihood of real catastrophe from global warming is low, and hence that he is wrong to say that no probability can be assigned to it. But I am far from an expert on the underlying science, and in any case Posner convincingly argues that some kind of positive tax on carbon emissions would be cost justified. The larger point is that an Anti-Catastrophe Principle has a legitimate place in environmental regulation, applying to uncertain dangers of catastrophe, at least when the costs of reducing those dangers are not huge and when incurring those costs does not divert resources from more pressing problems. The Anti-Catastrophe Principle is not the Precautionary Principle; it is far narrower than that, and it covers only a small set of environmental problems. But it nonetheless deserves to play a

living creature, is irreversible, and those who invoke irreversibility do not intend the notion of irreversible harm to apply to each and every mortality risk. And because time is linear, every decision is, in an intelligible sense, irreversible. If I play tennis at 11 A.M. today, that decision cannot be reversed, and what might have been done at that time will have been permanently lost. If government builds a new highway in upstate New York in May, that particular decision will be irreversible, even though the highway can be replaced or eliminated. Those who are concerned about irreversibility have something far more particular in mind. They mean something like a large-scale alteration in environmental conditions, one that imposes permanent, or nearly permanent, changes on those subject to them. But irreversibility in this sense is not a sufficient reason for a highly precautionary approach. At a minimum, the irreversible change has to be for the worse, and it must also rise to a certain level of magnitude. A truly minuscule change in the global temperature, even if permanent, would not justify expensive precautions if it is benign or if it imposes little in the way of harm. The idea of irreversibility is really important for two reasons. The first, referred to by Posner, draws on the analogy to stock options, and suggests that it is worthwhile to spend resources on (bounded) precautions to wait for more information to emerge before incurring a substantial and irreversible loss. The second reason involves the relationship between irreversibility and catastrophic harm; a harm is unlikely to be catastrophic if it can be reversed. For discussion, see Sunstein, *Laws of Fear*.

role in environmental protection, plausibly including global warming—calling for significant steps now, accompanied by further research to obtain a better understanding of the likelihood of real disaster.

Four qualifications are important. First, the Anti-Catastrophe Principle must be attentive to the full range of social risks; it makes no sense to take steps to avert catastrophe if those very steps would create catastrophic risks of their own. Second, use of the principle should be closely attentive to the idea of cost-effectiveness, which requires regulators to choose the least costly means of achieving their ends. In the context of global warming, there are many methods by which to reduce the relevant risks. Both nations and international institutions should choose those methods that minimize costs. Third, distributional considerations matter. The principle should be applied in a way that reduces extreme burdens on those least able to bear them. For global warming, there is a particular need to ensure that citizens of poor nations are not required to pay a great deal to contribute to the solution of a problem for which wealthy nations are most responsible—partly because the latter caused the problem in the first place, but also because poor people, faced with a global risk, need and deserve help from those who can provide it. Fourth, costs matter. The extent of precautions cannot reasonably be divorced from their expense. When the worst-case scenario is truly catastrophic and when probabilities cannot be assigned, a large margin of safety makes a great deal of sense.

VII. CONCLUSION

Because regulation itself often introduces new hazards, the Precautionary Principle risks incoherence; it forbids the very steps that it requires. For its part, CBA runs into two serious difficulties. The first involves the specification of both probabilities and outcomes. The second involves the translation of environmental risks into monetary equivalents.

For many of the problems involved in environmental regulation, it is possible to identify a range of outcomes in a way that allows CBA to get off the ground. But when catastrophic outcomes are possible and when regulators are operating under circumstances of uncertainty, it may well make sense to follow maximin. Even in such circumstances, however, an inquiry into costs cannot sensibly be avoided, not least because nations that impose high costs might increase mortality and morbidity risks as a result.

With respect to monetization, I have suggested that it is important to distinguish between the easy cases for using WTP and the harder ones. When the beneficiaries of environmental regulation pay all or most of its cost, the argument for using WTP is especially strong. In such cases, beneficiaries are unlikely to be helped if they are required to pay more than they are willing to pay; and requiring them to do so

is an insult to their autonomy.⁷² But when the beneficiaries of environmental regulation pay little or none of the cost, the regulation might be justified even if it fails CBA. To decide whether it is, it is necessary to identify the likely winners and losers. The most general conclusion is that CBA does not tell regulators all that they need to know; but without it, they will know far too little.

72. As I have emphasized, a low WTP does not mean that government should not subsidize the good; but regulation is not a subsidy.

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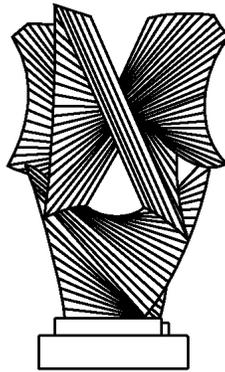
KEYNOTE

- **Cass Sunstein**, Robert Walmsley University Professor, Harvard Law School; former Administrator of the Office of Information and Regulatory Affairs
- In conversation with: **E. Donald Elliott**, Professor, Yale Law School; Senior of Counsel, Covington & Burling LLP; former Assistant Administrator and General Counsel of the U.S. Environmental Protection Agency

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Cognition and Cost-Benefit Analysis

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Cognition and Cost-Benefit Analysis

*Cass R. Sunstein**

“The American people have no doubt that more people die from coal dust than from nuclear reactions, but they fear the prospect of a nuclear reactor more than they do the empirical data that would suggest that more people die from coal dust, having coal-fired burners. They also know that more lives would be saved if we took that 25 percent we spend in the intensive care units in the last few months of the elderly’s lives, more children would be saved. But part of our culture is that we have concluded as a culture that we are going to rightly, or wrongly, we are going to spend the money, costing more lives, on the elderly. . . . I think it’s incredibly presumptuous and elitist for political scientists to conclude that the American people’s cultural values in fact are not ones that lend themselves to a cost-benefit analysis and presume that they would change their cultural values if in fact they were aware of the cost-benefit analysis.”¹

Joseph Biden

Many people have argued for cost-benefit analysis on economic grounds.² On their view, a primary goal of regulation is to promote economic efficiency, and cost-benefit analysis is admirably well-suited to that goal. Arguments of this kind have met with sharp criticism from those who reject the efficiency criterion³ or who believe that in practice, cost-benefit analysis is likely to produce a kind of regulatory paralysis.⁴

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¹ Confirmation Hearings for Stephen G. Breyer, to be an Associate Justice of the United States Supreme Court, Senate Committee on the Judiciary, 103d Cong., 2d Sess. 42 (July 14, 1994) (Miller Reporting transcript).

² See, e.g., W. Kip Viscusi, *Fatal Tradeoffs: Public & Private Responsibilities for Risk* (1992); W. Kip Viscusi, *Risk Equity*, *J. Legal Stud.* (forthcoming 2000).

³ See Elizabeth Anderson, *Value in Ethics and Economics* (1993).

⁴ See, e.g., Thomas O. McGarity, *Reinventing Rationality: The Role of*

In this essay I offer support for cost-benefit analysis, not from the standpoint of conventional economics, but on grounds associated with cognitive psychology and behavioral economics. My basic suggestion is that cost-benefit analysis is best defended as a means of overcoming predictable problems in individual and social cognition. Most of these problems might be collected under the general heading of *selective attention*. Cost-benefit analysis should be understood as a method for putting “on screen” important social facts that might otherwise escape private and public attention. Thus understood, cost-benefit analysis is a way of ensuring better priority-setting and of overcoming predictable obstacles to desirable regulation, whatever may be our criteria for deciding the hardest questions about that topic.

Of course much of the controversy over cost-benefit analysis stems from the difficulty of specifying, with particularity, what that form of analysis entails. None of the cognitive points made here supports any particular understanding of cost-benefit analysis. Certainly I do not mean to embrace the controversial and indeed implausible proposition that all regulatory decisions should be made by aggregating private willingness to pay, as if economic efficiency is or should be the goal of all regulation.⁵ I will attempt instead to provide an understanding of cost-benefit analysis that is agnostic on large issues of the right and the good, and that can attract support from people with diverse theoretical commitments, or with uncertainty about the appropriate theoretical commitments.⁶ In this

Regulatory Analysis in the Federal Bureaucracy (1991).

⁵ See Matthew Adler and Eric A. Posner, Rethinking Cost-Benefit Analysis, 109 Yale L.J. (forthcoming 1999); Cass R. Sunstein, Free Markets and Social Justice ch. 9 (1997); Amartya Sen, The Discipline of Cost-Benefit Analysis, J. Legal Stud. (forthcoming 2000) ; Matthew Adler and Eric A. Posner, J. Legal Stud. (forthcoming 2000). See, in particular, Amartya Sen, Rationality and Social Choice, 85 Am. Econ. Rev. 1, 17 (1995) (“There are plenty of social choice problems in all this, but in analyzing them, we have to go beyond looking only for the best reflection of given individual preferences, or the most acceptable procedures for choices based on those preferences.”) (emphasis in original).

⁶ See Adler & Posner, Rethinking Cost-Benefit Analysis, *supra* note, which is in the same general spirit as this essay, and from which I have learned a great deal. See also Amartya Sen, The Discipline of Cost-Benefit Analysis, J. Legal Stud. (forthcoming 2000), which seems to me in the same basic family.

sense I attempt to produce an *incompletely theorized agreement* on a certain form of cost-benefit analysis—an agreement on a form of cost-benefit analysis to which many different people, with diverse and competing views, should be willing to subscribe. This is partly an attempt to respond to the most natural objection to my principal claim here, an objection that would stress the possibility that cognitive problems would reappear in the values that end up being associated with various states of affairs.

The paper is organized as follows. In sections I, II, and III, I seek to defend the general idea of cost-benefit analysis, not as embodying any sectarian conception of value, but as a way of overcoming predictable problems in understanding risks to life and health at both the individual and social levels. In section IV, I briefly attempt to specify what cost-benefit analysis might be understood to entail. My goal is to show how this method, conceived in a particular way, might attract support from people with varying conceptions of the good and the right, including, for example, neoclassical economists and those who are quite skeptical about some normative claims in neoclassical economics, and including those who do and who do not take private preferences, and willingness to pay, as the proper foundation for regulatory policy. In other words, I try to show how a certain understanding of cost-benefit analysis might contain considerable appeal precisely because it overcomes problems in individual cognition, and do so without taking a stand on controversial issues about the ultimate goals of regulation and law.

A. A Tale of Two Tables

Let us begin with two simple tables. It is well known that there is a great deal of variability in national expenditures per life saved. Consider the following, which has come to define many discussions of these problems⁷:

⁷ Based on data from Office of Management and Budget, Budget of the United States Government Fiscal Year 1992 Pt 2, 370 Tbl C-2 (GPO 1991).

Table 1: Cost Per Life Saved

Cost-Effectiveness of Selected Regulations		
Regulation	Agency	Cost per premature death averted (\$ millions 1990)
Unvented Space Heater Ban	CPSC	0.1
Aircraft Cabin Fire Protection Standard	FAA	0.1
Auto Passive Restraint/Seat Belt Standards	NHTSA	0.1
Steering Column Protection Standard	NHTSA	0.1
Underground Construction Standards	OSHA-S	0.1
Trihalomethane Drinking Water Standards	EPA	0.2
Aircraft Seat Cushion Flammability Standard	FAA	0.4
Alcohol and Drug Control Standards	FRA	0.4
Auto Fuel-System Integrity Standard	NHTSA	0.4
Standards for Servicing Auto Wheel Rims	OSHA-S	0.4
Aircraft Floor Emergency Lighting Standard	FAA	0.6
Concrete & Masonry Construction Standards	OSHA-S	0.6
Crane Suspended Personnel Platform Standard	OSHA-S	0.7
Passive Restraints for Trucks & Buses (Proposed)	NHTSA	0.7
Side-Impact Standards for Autos (Dynamic)	NHTSA	0.8
Children's Sleepwear Flammability Ban	CPSC	0.8
Auto Side Door Support Standards	NHTSA	0.8
Low Altitude Windshear Equipment & Training Standards	FAA	1.3
Electrical Equipment Standards (Metal Mines)	MSHA	1.4
Trenching and Excavation Standards	OSHA-S	1.5
Traffic Alert and Collision Avoidance (TCAS) Systems	FAA	1.5

Cost-Effectiveness of Selected Regulations		
Regulation	Agency	Cost per premature death averted (\$ millions 1990)
Hazard Communication Standard	OSHA-S	1.6
Side-Impact Standards for Trucks, Buses, and MPVs (Proposed)	NHTSA	2.2
Grain Dust Explosion Prevention Standards	OSHA-S	2.8
Rear Lap/Shoulder Belts for Autos	NHTSA	3.2
Standards for Radionuclides in Uranium Mines	EPA	3.4
Benzene NESHAP (Original: Fugitive Emissions)	EPA	3.4
Ethylene Dibromide Drinking Water Standard	EPA	5.7
Benzene NESHAP (Revised: Coke Byproducts)	EPA	6.1
Asbestos Occupational Exposure Limit	OSHA-H	8.3
Benzene Occupational Exposure Limit	OSHA-H	8.9
Electrical Equipment Standards (Coal Mines)	MSHA	9.2
Arsenic Emission Standards for Glass Plants	EPA	13.5
Ethylene Oxide Occupational Exposure Limit	OSHA-H	20.5
Arsenic/Copper NESHAP	EPA	23.0
Hazardous Waste Listing for Petroleum Refining Sludge	EPA	27.6
Cover/Move Uranium Mill Tailings (Inactive Sites)	EPA	31.7
Benzene NESHAP (Revised: Transfer Operations)	EPA	32.9
Cover/Move Uranium Mill Tailings (Active Sites)	EPA	45.0
Acrylonitrile Occupational Exposure Limit	OSHA-H	51.5
Coke Ovens Occupational Exposure Limit	OSHA-H	63.5

Cost-Effectiveness of Selected Regulations		
Regulation	Agency	Cost per premature death averted (\$ millions 1990)
Lockout/Tagout	OSHA-S	70.9
Asbestos Occupational Exposure Limit	OSHA-H	74.0
Arsenic Occupational Exposure Limit	OSHA-H	106.9
Asbestos Ban	EPA	110.7
Diethylstilbestrol (DES) Cattlefeed Ban	FDA	124.8
Benzene NESHAP (Revised: Waste Operations)	EPA	168.2
1,2 Dichloropropane Drinking Water Standard	EPA	653.0
Hazardous Waste Land Disposal Ban (1 st 3 rd)	EPA	4,190.4
Municipal Solid Waste Landfill Standards (Proposed)	EPA	19,107.0
Formaldehyde Occupational Exposure Limit	OSHA-H	86,201.8
Atrazine/Alachlor Drinking Water Standard	EPA	92,069.7
Hazardous Waste Listing for Wood-Preserving Chemicals	EPA	5,700,000

This table should be taken with many grains of salt.⁸ It does not contain nearly all of the benefits from regulation, including those that fall short of mortalities averted (including illnesses averted, benefits for animals, and aesthetic and recreational gains). An adequate cost-benefit analysis would certainly take those benefits into account. We will shortly see that the table depends on many contentious assumptions, above all involving the appropriate discount rate; modest changes in the discount rate can greatly reduce the expenditures and the disparities. But at the very least, the table creates a presumption that the current system of regulation suffers from serious misallocation of resources. It also suggests that with

⁸ See Lisa Heinzerling, *Regulatory Costs of Mythic Proportions*, 107 Yale L.J. 1981 (1998).

better allocations, we could obtain large gains. Indeed, a recent study finds that it would be possible to save the same number of lives that we now save with tens of billions of dollars left over—and that better priority-setting could save 60,000 lives, and 636,000 life-years, annually at the same price.⁹

What is the source of the misallocations? Interest-group power undoubtedly plays a substantial role, as well-organized groups are able to obtain measures in their interest or to fend off measures that would harm them, and as poorly organized ones typically fail. Indeed, cost-benefit analysis might be defended partly as a corrective to interest-group power, operating as it might as a kind of technocratic check on measures that would do little good or even produce net harm (and also on measures that do much less good than they should).¹⁰ But officials are of course responsive not only to interest groups but also to general public pressures, and thus part of the answer must lie in the distinctive judgments of ordinary people, who do not assess risks through a well-informed cost-benefit lens. Indeed, divergences between expert and lay assessments of risks have been demonstrated in many places. Consider this comparison.¹¹

Table 2: Rating health risks

Public	EPA Experts
1. Hazardous waste sites	Medium-to-low
2. Exposure to worksite chemicals	High
3. Industrial pollution of waterways	Low
4. Nuclear accident radiation	Not ranked
5. Radioactive waste	Not ranked
6. Chemical leaks from underground storage tanks	Medium-to-low
7. Pesticides	High

⁹ See Tammy O. Tengs & John D. Graham, *The Opportunity Costs of Haphazard Social Investments in Life-Saving*, in *Risks, Costs, and Lives Saved* 167, 172-74 (Robert W. Hahn ed., 1996).

¹⁰ Of course it is possible that the content of the cost-benefit test will reflect interest-group power.

¹¹ See Stephen G. Breyer, *Breaking the Vicious Circle: Toward Effective Risk Regulation* 21 (1993).

Public	EPA Experts
8. Pollution from industrial accidents	Medium-to-low
9. Water pollution from farm runoff	Medium
10. Tap water contamination	High
11. Industrial air pollution	High
12. Ozone layer destruction	High
13. Coastal water contamination	Low
14. Sewage-plant water pollution	Medium-to-low
15. Vehicle exhaust	High
16. Oil spills	Medium-to-low
17. Acid rain	High
18. Water pollution from urban runoff	Medium
19. Damaged wetlands	Low
20. Genetic alteration	Low
21. Non-hazardous waste sites	Medium-to-low
22. Greenhouse effect	Low
23. Indoor air pollution	High
24. X-ray radiation	Not ranked
25. Indoor radon	High
26. Microwave oven radiation	Not ranked

The EPA itself has found that EPA policies are responsive not to expert judgments, but to lay assessments of risks.¹² Indeed, EPA policies track ordinary judgments extremely well.

If we put together these two tables, we can suggest a general hypothesis. The government currently allocates its limited resources poorly, and it does so partly because it is responsive to ordinary judgments about the magnitude of risks. A government that could insulate itself from misinformed judgments could save tens of thousands of lives and tens of billions of dollars annually. Let us attempt to be more specific about the cognitive problems that help account for current problems.

¹² See *id.*

I. Six Problems in the Public Demand for Regulation

For the moment, I attempt no controversial specification of cost-benefit analysis and understand the term broadly to refer to a regulatory method that calls for regulators to identify, and make relevant for purposes of decision, the good effects and the bad effects of regulation, and to quantify those as much as possible in terms of both dollar equivalents and life-years saved, hospital admissions prevented, workdays gained, and so forth. Let us also assume that cost-benefit analysis, thus understood, can accommodate distributional factors, by, for example, giving distributional weights to certain adverse effects, or by assuming uniform numbers for various goods (such as increased longevity) so as to ensure that they do not vary in accordance with wealth.

It is obvious that people, including government officials, often lack risk-related information; they may not know the nature of the health risks at issue, nor may they know the adverse consequences of risk reduction. By itself this point argues for cost-benefit analysis, simply as a means of producing the relevant information. The public demand for regulation is often based on misunderstandings of facts.¹³ But put this obvious point to one side. Why, exactly, might people's judgments about risk and risk regulation go badly wrong?¹⁴ There are six points here.

A. *The Availability Heuristic*

The first problem is purely cognitive: the use of the *availability heuristic* in thinking about risks.¹⁵ It is well-established that people tend to think that events are more probable if they can recall an

¹³ A colorful discussion is Barry Glassner, *The Culture of Fear: Why Americans are Afraid of the Wrong Things* (1999).

¹⁴ Some of these problems may infect market behavior as well, and when this is so there is a problem with using private willingness to pay as the basis for regulation, since private willingness to pay will (by hypothesis) be based on a misunderstanding of the facts. But markets contain some safeguards against these errors, through the budget constraint and opportunities for learning, and in any case the form of cost-benefit analysis that I support would not rest on mistaken factual judgments, as discussed in more detail below.

¹⁵ See Roger G. Noll & James E. Krier, *Some Implications of Cognitive Psychology for Risk Regulation*, 19 *J. Legal Stud.* 747, 749-760 (1990).

incident of its occurrence.¹⁶ Consider, for example, the fact that people typically think that more words, on any given page, will end with the letters “ing,” than have “n” as the second-to-last letter (though a moment’s reflection shows that this is not possible).¹⁷ With respect to risks, judgments are typically affected by the availability heuristic, so that people overestimate the number of deaths from highly publicized events (motor vehicle accidents, tornadoes, floods, botulism), but underestimate the number from less publicized sources (stroke, heart disease, stomach cancer).¹⁸ Similarly, much of the concern with nuclear power undoubtedly stems from its association with memorable events, including Hiroshima, Chernobyl, and Three-Mile Island.

To the extent that people lack information, or base their judgments on mental short-cuts that produce errors,¹⁹ a highly responsive government is likely to blunder. Cost-benefit analysis is a natural corrective, above all because it focuses attention on the actual effects of regulation, including, in some cases, the existence of surprisingly small benefits from regulatory controls. To this extent cost-benefit analysis should not be taken as undemocratic, but, on the contrary, should be seen as a means of fortifying (properly specified) democratic goals, by ensuring that government decisions are responsive to well-informed public judgments.

B. Aggravating Social Influences: Informational and Reputational Cascades

The availability heuristic does not, of course, operate in a social vacuum. It interacts with emphatically social processes, and in

¹⁶ See Amos Tversky & Daniel Kahneman, Judgment Under Uncertainty: Heuristics and Biases, in Judgment Under Uncertainty: Heuristics and Biases 3, 11 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982) (describing the availability heuristic).

¹⁷ Amos Tversky & Daniel Kahneman, Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment, 90 Psychol. Rev. 293, 295 (1983).

¹⁸ Jonathan Baron, Thinking and Deciding 218 (2d ed. 1994).

¹⁹ Other heuristics are likely to be at work, such as the representativeness heuristic, but availability is the most important source of distorted public judgments. See generally Amos Tversky & Daniel Kahneman, Judgment Under Uncertainty: Heuristics and Biases (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982).

particular with informational and reputational forces.²⁰ When one person says, through words or deeds, that something is or is not dangerous, he creates an *informational externality*.²¹ A signal by some person A will provide relevant data to others. When there is little private information, such a signal may initiate an *informational cascade*, with significant consequences for private and public behavior, and with possibly distorting effects on regulatory policy.²²

Imagine, for example, that A says that abandoned hazardous waste sites are dangerous, or that A initiates protest activity because such a site is located nearby. B, otherwise skeptical or in equipoise, may go along with A; C, otherwise an agnostic, may be convinced that if A and B share the relevant belief, the belief must be true; and it will take a confident D to resist the shared judgments of A, B, and C. The result of this set of influences can be social cascades, as hundreds, thousands, or millions of people come to accept a certain belief simply because of what they think other people believe.²³ There is nothing fanciful to the idea. Cascade effects help account for the existence of widespread public concern about abandoned hazardous waste dumps (a relatively trivial environmental hazard), and in more recent years, they spurred grossly excessive public fears of the pesticide Alar, of risks from plane crashes, and of dangers of shootings in schools in the aftermath of the murders in Littleton, Colorado. Such effects recently helped produce massive dislocations in beef production in Europe in connection with “mad cow disease”; they are currently giving rise to growing European fear of genetic engineering of food.

On the reputational side, cognitive effects may be amplified as well.²⁴ If many people are alarmed about some risk, you may not voice your doubts about whether the alarm is merited, simply in

²⁰ I draw in this section on Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 *Stan. L. Rev.* 683 (1999).

²¹ See Andrew Caplin & John Leahy, *Miracle on Sixth Avenue: Information Externalities and Search*, 108 *Econ. J.* 60 (1998).

²² See Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 *Stan. L. Rev.* 683, 720 (1999).

²³ See David Hirshleifer, *The Blind Leading the Blind: Social Influence, Fads, and Informational Cascades*, in *The New Economics of Human Behavior* 188 (Mariano Tommasi & Kathryn Ierulli eds., 1995).

²⁴ See *id.* at 727.

order not to seem obtuse, cruel, or indifferent. And if many people believe that a certain risk is trivial, you may not disagree through words or deeds, lest you appear cowardly or confused. The result of these forces can be cascade effects, mediated by the availability heuristic. Such effects can produce a public demand for regulation even though the relevant risks are trivial. At the same time, there may be little or no demand for regulation of risks that are, in fact, quite large in magnitude. Self-interested private groups can exploit these forces, often by using the availability heuristic. Consider the fact that European companies have tried to play up fears of genetically engineered food as a way of fending off American competition.

Cost-benefit analysis has a natural role here. If it is made relevant to decision, it can counteract cascade effects induced by informational and reputational forces, especially when the availability heuristic is at work. The effect of cost-benefit analysis is to subject a public demand for regulation to a kind of technocratic scrutiny, to ensure that the demand is not rooted in myth, and to ensure as well that government is regulating risks even when the public demand (because insufficiently informed) is low. And here too there is no democratic problem with the inquiry into consequences. If people's concern is fueled by informational forces having little reliability, and if people express concern even though they are not fearful, a governmental effort to "cool" popular reactions is hardly inconsistent with democratic ideals. Similarly, there is nothing undemocratic about a governmental effort to divert resources to serious problems that have not been beneficiaries of cascade effects.

C. Dangers On-Screen, Benefits Off-Screen

Why are people so concerned about the risks of nuclear power, when experts tend to believe that the risks are quite low—lower, in fact, than the risks from competing energy sources, such as coal-fired power plants, which produce relatively little public objection? Why do they believe that small risks from pesticides should be regulated, even if comparatively small risks from X-rays are quite tolerable?

Suggestive answers come from research suggesting that for many activities that pose small risks but that nonetheless receive

public concern, people perceive low benefits as well as high risks.²⁵ For example, nuclear power itself is seen as a low-benefit, high-risk activity. Similar findings appear for some activities that are in fact relatively high-risk: a judgment of “low risk” accompanies a judgment of “high benefits.” The very fact that they are known to have high benefits skews judgment in their favor, and hence makes people understate the costs as well.

The obvious conclusion is that sometimes people favor regulation of some risks because the underlying activities are not seen to have compensating benefits.²⁶ Thus for some activities, tradeoffs are not perceived at all. Dangers are effectively on-screen, but benefits are off-screen. Note that this is not because such activities do not, in fact, have compensating benefits. It is because of a kind of perceptual illusion.

An important factor here is *loss aversion*. People tend to be loss averse, which means that a loss from the status quo is seen as more undesirable than a gain is seen as desirable.²⁷ In the context of risk regulation, the consequence is that any newly introduced risk, or any aggravation of existing risks, is seen as a serious problem, even if the accompanying benefits (a gain from the status quo and hence perceived as less salient and less important) are considerable.²⁸ Thus

²⁵ The fact that nuclear power, and application of pesticides, produce benefits as well as risks may not “register” on the lay viewscreen, and this may help produce a “high risk” judgment. See Ali Siddiq Alhakami and Paul Slovic, A Psychological Study of the Inverse Relationship Between Perceived Risk and Perceived Benefit, 14 Risk Analysis 1085, 1088 (1994).

²⁶ See Howard Margolis, *Dealing With Risk* (1996), for a detailed discussion of how this point bears on the different risk judgments of experts and lay people.

²⁷ See Richard H. Thaler, The Psychology of Choice and the Assumptions of Economics, in *Quasi Rational Economics* 137, 143 (Richard H. Thaler ed., 1991) (arguing that “losses loom larger than gains”); Daniel Kahneman, Jack L. Knetsch, and Richard H. Thaler, Experimental Tests of the Endowment Effect and the Coase Theorem, 98 J. Pol. Econ. 1325, 1328 (1990); Colin Camerer, Individual Decision Making, in John H. Kagel and Alvin E. Roth, eds, *The Handbook of Experimental Economics* 665-670 (1995).

²⁸ For some policy implications of loss aversion, see Jack L. Knetsch, Reference States, Fairness, and Choice of Measure to Value Environmental Changes, in *Environment, Ethics, and Behavior: The Psychology of Environmental Valuation and Degradation* 52, 64-65 (Max H. Bazerman,

when a new risk adds danger, people may focus on the danger itself, and not on the benefits that accompany the danger. And an important problem here is that in many cases where dangers are on-screen and benefits off-screen, the magnitude of the danger is actually quite low. Cost-benefit analysis can be a corrective here, by placing the various effects on-screen.

D. Systemic Effects and “Health-Health Tradeoffs”

Often people focus on small pieces of complex problems, and causal changes are hard to trace. Consider an analogy. The German psychologist Dietrich Dorner has done some illuminating computer experiments designed to see whether people can engage in successful social engineering.²⁹ Participants are asked to solve problems faced by the inhabitants of some region of the world. Through the magic of the computer, many policy initiatives are available to solve the relevant problems (improved care of cattle, childhood immunization, drilling more wells). But most of the participants produce eventual calamities, because they do not see the complex, system-wide effects of particular interventions. Only the rare participant can see a number of steps down the road—to understand the multiple effects of one-shot interventions on the system.

Often regulation has similar systemic effects. A decision to regulate nuclear power may, for example, increase the demand for coal-fired power plants, with harmful environmental consequences.³⁰ A decision to impose fuel economy standards on new cars may cause a “downsizing” of the fleet, and in that way increase risks to life. A decision to ban asbestos may cause manufacturers to use less safe substitutes. Regulation of tropospheric ozone may control the health dangers of ozone, but ozone has various benefits as well, including protection against cataracts and skin cancer; hence regulation of ozone may cause health problems

David M. Messick, Ann E. Tenbrunsel & Kimberly A. Wade-Benzoni eds., 1997).

²⁹ See Dietrich Dorner, *The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right* (1996).

³⁰ See Stephen Breyer, *Vermont Yankee and the Court’s Role in the Nuclear Energy Controversy*, 91 Harv. L. Rev. 1833, 1835-90 (1978). See generally Peter Huber, *Electricity and the Environment: In Search of Regulatory Authority*, 100 Harv. L. Rev. 1002 (1987).

equal to those that it reduces.³¹ Indeed, regulation of ozone will increase electricity prices, and because higher electricity prices will deprive poor people of air conditioning or lead them to use it less, such regulation may literally kill people.³²

These are simply a few examples of situations in which a government agency is inevitably making “health-health tradeoffs” in light of the systemic effects of one-shot interventions. Indeed, any regulation that imposes high costs will, by virtue of that fact, produce some risks to life and health, since “richer is safer.”³³ A virtue of cost-benefit analysis is that it tends to overcome people’s tendency to focus on parts of problems, by requiring them to look globally at the consequences of apparently isolated actions.

E. Emotions and Alarmist Bias

A set of data now suggests that people are subject to “alarmist bias.”³⁴ The mere existence of discussions of new risks can aggravate concern, even when the discussions take the form of assurances that the risk level is relatively low. And when presented with information

³¹ See Randall Lutter & Christopher Wolz, UV-B Screening by Tropospheric Ozone: Implications for the NAAQS, 31 *Envl. Sci. & Tech.* 142A, 144A (1997) (estimating that the EPA’s new ozone NAAQS could cause 25 to 50 more melanoma skin cancer deaths and increase the number of cataract cases by 13,000 to 28,000 each year). See also Ralph L. Keeney & Kenneth Green, Estimating Fatalities Induced by Economic Impacts of EPA’s Ozone and Particulate Standards 8 (Reason Public Policy Institute, Policy Study No. 225, June 1997) (calculating that if attainment of the new standards costs \$10 billion annually, a number well within EPA’s estimated cost range, it will contribute to 2,200 premature deaths annually). On the general phenomenon, see John D. Graham and Jonathan Baert Wiener, *Risk Versus Risk* (1995).

³² See C. Boyden Gray, *The Clean Air Act Under Regulatory Reform*, 11 *Tulane Envt’l L.J.* 235 (1998).

³³ John D. Graham, Bei-Hung Chang, & John S. Evans, *Poorer Is Riskier*, 12 *Risk Analysis* 333, 333-35 (1992); Frank B. Cross, *When Environmental Regulations Kill: The Role of Health-Health Analysis*, 22 *Ecol. L. Q.* 729 (1995); Ralph L. Keeney, *Mortality Risks Induced by the Costs of Regulations*, 8 *J. Risk & Uncertainty* 95 (1994); Aaron Wildavsky, *Richer is Safer*, 60 *Pub. Interest* 23 (1980); Aaron Wildavsky, *Searching for Safety* 59-75 (1988).

³⁴ See W. Kip Viscusi, *Alarmist Decisions with Divergent Risk Information*, 107 *Econ. J.* 1657, 1657-58 (1997) (studying situations under which “[n]ew information about risks may generate alarmist actions that are not commensurate with the magnitude of the risks”).

suggesting that a risk may range from A (low) to Z (high), the high risk number is especially salient, and it appears to have a disproportionate effect on behavior.

A recent paper by George Loewenstein et al. suggests that risk-related concerns are often based on “feelings” rather than judgments.³⁵ Thus risk-related objections can be a product not so much of thinking as of intense emotions, often produced by extremely vivid images of what might go wrong. This point is supported by evidence that reported feelings of worry are sometimes sensitive not to the probability of the bad outcome, but only to the severity of the bad outcome.³⁶ Vivid mental pictures of widespread death or catastrophe can drive a demand for risk regulation. Consider, for example, the motivations of those who press for regulation of airplane safety in the aftermath of an airplane crash, even though such regulation may increase travel risks on balance (by driving up the price of flying and causing a shift to driving, a more dangerous form of transportation).³⁷

It is important to be careful with the relevant categories here. There is no sharp distinction between “cognition” and “emotion.”³⁸ Emotions are generally the products of beliefs, and hence an emotional reaction to risk—terror, for example—is generally mediated by judgments.³⁹ But this is not always true; sometimes the operation of the brain allows intense emotional reactions with minimal cognitive activity.⁴⁰ In any case the judgments that fuel emotions may be unreliable. We need not venture into controversial territory in order to urge not that emotions are free of cognition, but that some risks seem to produce extremely sharp, largely visceral

³⁵ See Loewenstein, G. F., Weber, E. U., Hsee, C. K. & Welch, E. S., Risk as Feelings (unpublished draft 5/4/99).

³⁶ Loewenstein, Weber, Hsee, & Welch, Draft at 12.

³⁷ See Robert W. Hahn, *The Economics of Airline Safety and Security: An Analysis of the White House Commission's Recommendations*, 20 Harv. J.L. & Pub. Pol'y 791 (1997).

³⁸ See Dan M. Kahan & Martha C. Nussbaum, *Two Conceptions of Emotion in the Criminal Law*, 96 Colum. L. Rev 269 (1996); Jon Elster, *Alchemies of the Mind* (1999).

³⁹ See Martha Nussbaum, *Upheavals of Thought* (forthcoming); Elster, *supra* note.

⁴⁰ See Loewenstein et al., *supra*.

reactions. These reactions are sometimes largely impervious to argument. Indeed, experience with “mass panics” has shown exactly this structure, as assurances based on statistical evidence have little effect in the face of vivid images of what might go wrong.⁴¹ Some fears even appear to have a genetic foundation; consider, as a possible example, fear of snakes, which appears in people who have no reason to think that snakes are dangerous.

The role of cost-benefit analysis is straightforward here. Just as the Senate was designed to have a “cooling effect” on the passions of the House of Representatives, so cost-benefit analysis might ensure that policy is driven not by hysteria or alarm, but by a full appreciation of the effects of relevant risks and their control. If the hysteria survives an investigation of consequences, then the hysteria is fully rational, and an immediate and intensive regulatory response is entirely appropriate.

Nor is cost-benefit analysis, in this setting, only a check on unwarranted regulation. It can and should serve as a spur to regulation as well. If risks do not produce visceral reactions, partly because the underlying activities do not yield vivid mental images, cost-benefit analysis can show that they nonetheless warrant regulatory control. The elimination of lead in gasoline is a case in point.⁴²

F. Separate Evaluation and Incoherence

Suppose that you are asked to say, without reference to any other problem, how much you would be willing to pay to protect certain threats to coral reefs. Now suppose that you are asked to say, without reference to any other problem, how much you would pay to protect against skin cancer among the elderly. Suppose, finally, that you are asked to say how much you would be willing to pay to protect certain threats to coral reefs and how much you would be willing to pay to protect against skin cancer among the elderly. Empirical evidence suggests that people’s answers to questions, taken

⁴¹ See the discussion of Love Canal in Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 *Stan. L. Rev.* 683, 691-98 (1999).

⁴² See *Economic Analyses at EPA: Assessing Regulatory Impact* (Richard D. Morgenstern ed., 1997).

in isolation, are very different from their answer to questions when they are asked to engage in cross-category comparisons.⁴³ It appears that when people assess problems in isolation, they do so by reference to other problems in the same basic category—and that this intuitive process is dramatically altered when people are explicitly told to assess problems from other categories as well. The result of assessing individual problems, taken in isolation, is to produce what people would themselves consider a form of incoherence.

The forms of regulatory spending shown in Table I undoubtedly reflect, in part, the kinds of irrationality that follow from judgments that are made without close reference to other problems from different categories. Incoherence is the natural result of the relevant cognitive processes. The argument for a form of cost-benefit analysis is straightforward: It operates as a built-in corrective to some of the distortions that come from taking problems in isolation. The point applies to “contingent valuation” assessments; but it operates more broadly with respect to expenditure decisions that otherwise risk incoherence, simply by virtue of the fact that they operate without looking at other problems, including those from other categories.

G. General Implications

The cognitive argument for cost-benefit analysis, thus understood, is now in place. It is true but obvious to say that people lack information and that their lack of information can lead to an inadequate or excessive demand for regulation, or a form of “paranoia and neglect.”⁴⁴ What is less obvious is that predictable features of cognition will lead to a demand for regulation that is unlikely to be based on the facts. When people ask for regulation because of fears fueled by availability cascades, and when the benefits from the risk-producing activity are not registering, it would be highly desirable to create cost-benefit filters on their requests. When interest-groups exploit cognitive mechanisms to create unwarranted fear or diminish

⁴³ See Daniel Kahneman, David Schkade, Iliana Ritov, & Cass R. Sunstein, *Reversals of Judgment: The Effect of Cross-Category Comparisons on Intendedly Absolute Responses* (unpublished manuscript 1999).

⁴⁴ See John D. Graham, *Making Sense of Risk: An Agenda for Congress*, in *Risks, Costs, and Lives Saved: Getting Better Results from Regulation* 183 (Robert W. Hahn ed., 1996).

concern with serious problems, it is desirable to have institutional safeguards. When people fail to ask for regulation for related reasons, it would be desirable to create a mechanism by which government might nonetheless act if the consequences of action would be desirable. Here too cost-benefit balancing might be desirable, as in fact it has proved to be in connection not only with the phase-out of lead but also with the Reagan Administration's decision to phase-out CFC's, motivated by a cost-benefit analysis suggesting that the phase-out would do far more good than harm.⁴⁵

A caveat: It is entirely possible that the public demand for regulation will result from something other than cognitive errors, even if the relevant risk seems low as a statistical matter. People may think, for example, that it is especially important to protect poor children from a certain risk in a geographically isolated area, and they may be willing to devote an unusually large amount to ensure that protection. What seems to be a cognitive error may turn out, on reflection, to be a judgment of value, and a judgment that can survive reflection. I will return to this point. For the moment note two simple points. Whether an error is involved is an empirical question, subject, at least in principle, to empirical testing. And nothing in cost-benefit analysis would prevent people from devoting resources to projects that they consider worthy, even if the risk is relatively low as a statistical matter.

I have not yet discussed what cost-benefit analysis might specifically entail, and there are potentially serious controversies here. But it will be best to discuss that question after dealing with some direct objections.

⁴⁵ See *Economic Analysis at EPA*, supra note 33. See also Richard Elliot Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet* 63 (1991) (Reagan administration supported aggressive regulation largely because cost-benefit analysis from the Council of Economic Advisers demonstrated that "despite the scientific and economic uncertainties, the monetary benefits of preventing future deaths from skin cancer far outweighed costs of CFC controls as estimated either by industry or by EPA").

II. Objections: Populism, Quantification, and Rival Rationalities

The argument made thus far, cautious though it may seem, runs into three obvious objections. The first involves democratic considerations; the second points to the limitations of quantification; the third involves the possibility that ordinary people's judgments are based not on cognitive limitations, but on a kind of "rival rationality."

A. Populism

The first objection, populist in character, is captured by the opening quotation from Senator Biden. The objection would be that in a democracy, government properly responds to the social "demand" for law. Government does not legitimately reject that demand on the ground that cost-benefit analysis suggests that it should not act. On this view, a democratic government should be accountable. Any approach that uses efficiency, or technocratically-driven judgments, as a brake on accountability is fatally undemocratic.

The problem with this objection is that it rests on a controversial and even unacceptable conception of democracy, one that sees responsiveness to citizens' demands, whatever their factual basis, as the foundation of political legitimacy. If those demands are uninformed, it is perfectly appropriate for government to resist them. Indeed, it is far from clear that reasonable citizens want, or would want, their government to respond to their uninformed demand. The analysis thus far suggests that the relevant demands are, in fact, uninformed or unreflective. If this is so, they should be subject to deliberative constraints of the sort exemplified by cost-benefit analysis. After that analysis has been generated, and public officials have taken it into account, democratic safeguards continue to be available, and electoral sanctions can be brought to bear against those who have violated the public will. The simple point is that if, once informed of the cost-benefit tradeoff, people continue to seek some particular regulation, then democratic considerations require government to restrict their choice.⁴⁶ At the very least, cost-benefit

⁴⁶ At least assuming the decisions involve nothing peculiar or invidious, such as racial animus.

analysis should be an ingredient in the analysis, showing people that the consequences of various approaches might be different from what they seem.

B. Quantification and Expressive Rationality

I have noted that the cost-benefit chart described above raised many questions. Those questions might be made into a thoroughgoing challenge to cost-benefit analysis. In an extensive discussion, Lisa Heinzerling has attempted to do precisely that.⁴⁷ Heinzerling argues that many of the values depend on controversial judgments of value, and that the table itself masks those judgments. Her first point is that the table includes many regulations that were in fact rejected. Some of them were not issued on the ground that their benefits would exceed their costs. The table is also underinclusive, for many regulations have been issued that impose dramatically lower costs than many of those included on the table. But by itself this is no indictment of cost-benefit analysis. Indeed, it provides support for cost-benefit analysis insofar as it suggests that the tool has resulted in a rejection of undesirable regulations.

But Heinzerling goes further. She contends that many of these numbers depend on controversial judgments about how to discount future benefits. Above all, the charts depend on a 10% discount rate, whereas the agencies tended to use a lower discount rate, or not to discount at all. Heinzerling also suggests that the charts depend on downward adjustment of the agency's estimates of risk. Her own estimates result in the following risk table, adjusted for inflation.

Table III: Corrected (?) Table on
Cost-Effectiveness of Regulations

Regulation	Adjusted Cost Estimate (Thousands of 1995 dollars)
Asbestos (OSHA 1972)	\$700
Benzene (OSHA 1985)	\$2,570
Arsenic/Glass Plant (EPA 1986)	\$6,610

⁴⁷ See Lisa Heinzerling, *Regulatory Costs of Mythic Proportions*, 107 *Yale L.J.* 1981 (1998).

Regulation	Adjusted Cost Estimate (Thousands of 1995 dollars)
Ethylene Oxide (OSHA 1984)	\$3,020-\$5,780
Uranium Mill Tailings/Inactive (EPA 1983)	\$2,410
Acrylonitrile (OSHA 1978)	\$8,570
Uranium Mill Tailings/Active (EPA 1983)	\$3,840
Coke Ovens (OSHA 1976)	\$12,420
Asbestos (OSHA 1986)	\$3,860
Arsenic (OSHA 1978)	\$24,490
Arsenic/Los-Arsenic Copper (EPA 1986)	\$5,740
Land Disposal (EPA 1986)	\$3,280
Formaldehyde (OSHA 1985)	\$31,100

This table may be more accurate than Table I; certainly there are problems with any approach that assumes a 10% discount rate. But even if Heinzerling's table is better, it offers an ironic lesson, serving largely to confirm the point that current regulatory policy suffers from poor priority-setting. The disparities here are not as dramatic, and they certainly do not establish pervasive overregulation; but they do support the view that resources are being misallocated.

Heinzerling does not, however, conclude that this revised table is the appropriate basis for evaluating regulatory policy. Her aim is not to come up with a better table from which to reassess government behavior. On the contrary, she takes her argument to be a basis for rejecting cost-benefit analysis altogether. This, then, is a lesson about "the perils of precision."⁴⁸ Heinzerling also suggests that it "would be better if we left the picture blurry, and declined to connect the dots between all the confusing and sometimes conflicting intuitions and evidence."⁴⁹ She is concerned that "some, probably many, people will be fooled into believing that numerical estimates of risks, costs, and benefits are impartial reflections of factual reality, in which case the likely result of increased reliance on quantification in setting regulatory policy will

⁴⁸ Id. at 2042.

⁴⁹ Id. at 2069.

be that the side that best obscures the value choices implicit in its numbers will prevail.”⁵⁰

There is considerable truth here; but I think that Heinzerling’s lesson is overdrawn. Truth first: If an agency says that the cost of regulation is one hundred million dollars, and the benefit seventy million dollars, we still know much less than we should. It is important to know who bears these costs, and if possible with what consequences. Will wages be lower? Whose wages? Will prices be higher? Of what products? A disaggregated picture of the benefits would also be important; what does the seventy million dollar figure represent? Consider, for example, a recent table explaining that the costs of skin cancer, from health effects of reducing tropospheric ozone, are between \$290 million and \$1.1 billion, with dollar subtotals for skin cancers and cataracts.⁵¹ By itself, this table is insufficiently informative to tell people what they need to know.

Heinzerling is therefore on firm ground if she means to suggest that the dollar numbers cannot substitute for a fuller inquiry into what is at stake. Any cost-benefit analysis should include more than the monetary values by, for example, showing what the values are about, such as life-years saved and accidents averted (see the Appendix for illustrations). But her own table suggests that the general conclusion—that cost-benefit analysis can illuminate and discipline inquiry—remains unassailable. If regulation ranges from tens of thousands to tens of millions per life saved, at least there is a presumptive problem. One of the functions of cost-benefit balancing is to help show where limited resources should go. In fact there is much to be gained from attempting to quantify various effects, to the extent that this is possible. A regulation of particulates is hard to evaluate without knowing, for example, the number of deaths averted and the range of consequences for morbidity: How many work-days will be saved that would otherwise be lost? How many hospitalizations will be avoided? How many asthma attacks

⁵⁰ Id. at 2068.

⁵¹ See Randall Lutter & Christopher Wolz, UV-B Screening by Tropospheric Ozone: Implications for the NAAQS, 31 *Envtl. Sci. & Tech.* 142A, 145 (1997). In fairness to the authors, it should be noted that a previous table in their essay describes adverse health effects in quantitative terms by listing the numbers of cases averted.

will be prevented? It could even be useful to attempt to describe these effects in terms of “quality-adjusted life years,”⁵² knowing that here too, a good analyst will go back and forth between bottom lines and the judgments that go into their creation.

I suspect that there may be theoretical claims behind Heinzerling’s skepticism about quantification. She may believe that many of the goods at stake in regulation (human and animal life and health, recreational and aesthetic opportunities) are not merely commodities, that people do not value these goods in the same way that they value cash, and that cost-benefit analysis, by its reductionism, is inconsistent with people’s reflective judgments about the issues at stake. Arguments of this sort have been developed in some philosophical challenges to cost-benefit analysis.⁵³

Such arguments are convincing if cost-benefit analysis is taken to suggest a controversial position in favor of the commensurability of all goods—if cost-benefit is seen to insist that people value environmental amenities, or their own lives, in the same way that they value a bank account, or if cost-benefit is taken as a metaphysical claim to the effect that all goods can be aligned along a single metric, or if five lives saved is seen as the same, in some deep sense, as \$20-\$30 million saved. Part of what people express, in their daily lives, is a resistance to this form of commensurability, and some goods are believed to have intrinsic as well as instrumental value.⁵⁴ The existence of qualitative differences among goods fortifies the claim that any “bottom line” about costs and benefits should be supplemented with a more qualitative description of the variables involved. But cost-benefit analysis should not be seen as embodying a reductionist account of the good, and much less as a suggestion that everything is simply a “commodity” for human use. It is best taken as pragmatic instrument, agnostic on the deep issues and designed to assist people in making complex judgments where multiple goods are involved. To put it another way, cost-benefit

⁵² See Richard H. Pildes & Cass R. Sunstein, *Reinventing the Regulatory State*, 62 U. Chi. L. Rev. 1 (1995); *American Trucking Ass’n v. EPA*, 1999 WL 300618 (D.C. Cir. May 14, 1999).

⁵³ See Elizabeth Anderson, *Value in Ethics and Economics* (1993).

⁵⁴ See *id.*

analysis might be assessed pragmatically, or even politically, rather than metaphysically.

We should conclude that the final number may provide less information than the ingredients that went into it, and that officials should have and present cost-benefit analysis in sufficiently full terms to enable people to have a concrete sense of the effects of regulation. This is an argument against some overambitious understandings of what cost-benefit balancing entails. But it is not an argument against cost-benefit balancing.

C. Rival Rationalities

The final objection to the discussion thus far is the most fundamental. On this view, cost-benefit analysis is not desirable as a check on ordinary intuitions, because those intuitions reflect a kind of “rival rationality.” Ordinary people have a complex understanding of what it is that they want to maximize. They do not simply tabulate lives saved; they ask questions as well about whether the relevant risk is controllable, voluntary, dreaded, equitably distributed, and potentially catastrophic. Consider the Table 4.

Some people suggest that to the extent that ordinary people disagree with experts, they have a “thicker” or “richer” rationality, and that democracy should respect their judgments.⁵⁵ On a more moderate view, government’s task is to distinguish between lay judgments that are products of factual mistakes (produced, for example, by the availability heuristic), and lay judgments that are products of judgments of value (as in the view that voluntarily incurred risks deserve less attention than those that are involuntarily occurred ones).⁵⁶ In any case the “psychometric paradigm” is designed show how ordinary people’s judgments are responsive to an array of factors other than lives saved.⁵⁷

⁵⁵ See Paul Slovic, Baruch Fischhoff & Sarah Lichtenstein, Regulation of Risk: A Psychological Perspective, in Regulatory Policy and the Social Sciences 241 (Roger G. Noll ed., 1985);

⁵⁶ See Richard H. Pildes & Cass R. Sunstein, Reinventing the Regulatory State, 62 U. Chi. L. Rev. 1 (1995).

⁵⁷ See Paul Slovic, Trust, Emotion, Sex, Politics and Science: Surveying the Risk Assessment Battlefield, 44 U. Chi. Leg. F. 59 (1997).

Table 4: Aggravating and mitigating factors
in risk judgments

Risk Traits	Aggravating	Mitigating
Familiarity	New	Old
Personal control	Uncontrollable	Controllable
Voluntariness	Involuntary	Voluntary
Media attention	Heavy media coverage	Ignored by media
Equity	Unfairly distributed	Equitably distributed
Children	Children at special risk	Children not at risk
Future generations	Future generations at risk	Future generations not at risk
Reversibility	Irreversible	Reversible
Identifiability of victims	Victims known	Victims not identifiable
Accompanying benefits	Benefits clear	Benefits invisible
Source	Human origin	Created by nature
Trust in relevant institutions	Low trust in relevant institutions	High trust in relevant institutions
Timing of adverse effects	Effects delayed	Effects immediate
Understanding	Mechanisms poorly understood	Mechanisms understood
Precedents	History of accidents	No past accidents

One problem with this view is that it may not be a criticism of cost-benefit analysis at all; it may suggest only that any judgment about benefits and costs (whether or not based on willingness to pay) will have to take account of people's divergent assessments of divergent risks. In principle, there is no problem with doing exactly that. There is, however, reason to question the now-conventional view that qualitative factors of this kind in fact explain people's disagreement with experts about certain risks of death. In fact I do not believe that the "psychometric paradigm" can defend its own central claims. The first point is technical. In the relevant studies, the key factors—voluntariness, controllability, potentially catastrophic nature—have not been generated spontaneously or independently by subjects. Instead those who conduct the relevant

research ask people to rank risks along these dimensions . From this information it cannot be said that ordinary people think that these qualitative differences justify departing from the “lives saved” criterion. The evidence is simply too indirect.

Now this does not mean that the “rival rationalities” view is wrong. There is independent evidence to suggest that people consider some deaths to be worse than others.⁵⁸ They are apparently willing to pay more, for example, to prevent a cancer death than to prevent an unforeseen instant death, and there is some evidence that voluntarily incurred risks receive less social concern than risks that are involuntarily incurred. Distributional judgments also appear to play some role in assessments about how to allocate scarce resources. But these points raise further questions.⁵⁹

No doubt it is *possible* that people’s judgments about risk severity are a product of some of the more qualitative considerations listed above; this idea leads to the widespread view that ordinary people have a “richer” rationality than do experts, since ordinary people look at the nature and causes of death, not simply at aggregate deaths at issue. But it is also possible that an apparently “rich” judgment that a certain risk is severe, or not severe, depend not on well-considered judgments of value, but instead on an absence of ordinary contextual cues, on a failure to see that tradeoffs are inevitably being made, on heuristic devices that are not well-adapted to the particular context, or instead on a range of confusing or confused ideas that people cannot fully articulate. When people say, for example, that the risk of nuclear power is very serious, they may be responding to their intense visceral concern, possibly based on (uninformed) statistical judgments about likely lives at risk and on their failure to see (as they do in other contexts) that that risk is accompanied by a range of social benefits. Thus it is possible that a judgment that a certain risk of death is unusually bad is not a “rich” qualitative assessment but an (unreliable) intuition based on a rapid balancing that prominently includes perceived lives at stake and the

⁵⁸ Some of the data is collected in Cass R. Sunstein, *Bad Deaths*, 14 *J. Risk & Uncertainty* 259 (1997).

⁵⁹ I draw heavily in the next pages from *id.*; Margolis, *supra* note, contains an excellent discussion of this point, from which I have learned a great deal.

perceived presence of small or no benefits associated with the risk-producing activity.

Thus the question becomes whether citizen judgments that certain deaths are especially bad can survive a process of reflection. My conclusion is that understood in a certain way, the notions of dreaded deaths and unfairly distributed deaths are fully reasonable and deserve a role in policy. But the special concerns about deaths stemming from involuntarily run and uncontrollable risks raise serious doubts; as frequently invoked, they do not justify according additional concern to deaths that “code” as a product of involuntary or uncontrollable risks. At most, they suggest that government might spend more resources on deaths where the cost of risk-avoidance is especially high, and devote less attention to deaths where the cost of risk-avoidance is especially low.

1. Dread

It is often said, on the basis of evidence like that outlined above, that especially dreaded deaths deserve special attention. Deaths from cancer and AIDS fall in this category. There is nothing at all mysterious to this idea. The underlying point is probably that the relevant deaths are especially grueling and hence there is a kind of “pain and suffering premium”—not merely a life lost, but an antecedent period of intense emotional and physical difficulty as well. This period of intense difficulty might impose costs on those with the illness and on friends and family members as well. Sudden, unanticipated deaths can be dreaded too—consider the extremely unpleasant idea of dying in an airplane crash. But the dread here stems from some factor (perhaps terror) different from and much shorter than the extended period of suffering that precedes some deaths. Thus it might be concluded that dreaded deaths deserve special attention in accordance with the degree of suffering that precedes them. A special problem with cancer deaths is that at least some of the time, people like to have upward-sloping utility. It is particularly bad to be in a situation in which things will constantly get worse.⁶⁰ With cancer deaths, the slope goes downward fairly consistently until the point of death.

⁶⁰ See George Loewenstein & Nachom Sicherman, Do Workers Prefer Increasing Wage Profiles?, 9 J. Lab. Econ. 67, 71-75 (1991); George

2. *Voluntariness*

People seem to perceive voluntarily incurred risks as less troublesome than involuntarily incurred risks. Consider diverse public reactions to airplane crashes and automobile crashes. Or consider the fact that tobacco is by far the largest source of preventable deaths in the United States. Why do we not devote much more of our regulatory effort to reducing smoking? The reason seems to lie in a judgment that smoking is a voluntary activity and hence the resulting deaths are less troublesome than other sorts of deaths. Here—it might be said—people have voluntarily assumed the relevant risks.

a. Puzzles: high cost of avoidance rather than involuntariness?

It is tempting to think that the apparent lay preference for according greater weight to “involuntary” risks to life requires significant qualification of the criterion of lives or life-years saved. But a simple reference to voluntariness, if taken to suggest something special about “lay rationality,” raises many puzzles. The most important problem is that it is not simple to know when a risk is voluntarily incurred. “Voluntariness” may be entirely absent in the case of an unforeseeable collision with an asteroid; but voluntariness is not, in the cases under consideration, an all-or-nothing matter. Instead it is a matter of degree. Return to the conventional thought that airplane crashes are “involuntary” and automobile crashes more “voluntary.” Certainly it would be possible to see the risks from air travel as voluntarily run; people have a choice about whether to fly, and when they do fly, they pay a certain amount for a certain package, including risks of various sorts. The same is true of automobile safety—and it is not in any way less true, however disparately the two kinds of risks may “seem.” Perhaps people are responding to the perceived fact that they have no control over the pilot’s behavior, whereas they have considerable control over automobile safety since they are themselves drivers. But airlines respond to market forces, including the market for safety, and many people injured in automobile accidents are not at fault, and thus along the dimension of voluntariness this is hardly a crisp distinction. The difference between the two risks is hardly so

Loewenstein & Drazen Prelec, Negative Time Preference, 81 Am. Econ. Rev. (Papers & Proc.) 347, 347 (1991).

categorical as to justify an assessment that they fall on poles of some voluntariness-involuntariness divide. Indeed, it is not clear even what is meant by the suggestion that one is voluntary and the other is not. Something else appears to underlie that suggestion.

b. Three cases

To shed some light on the issue, let us consider three classes of cases. First, consider the question whether workers exposed to cancer risks are voluntarily or involuntarily so exposed. If workers do not know about such risks—if they lack relevant information—we seem to have an easy case of involuntariness. Thus it makes sense to say that risks are run involuntarily when the people running them do not know about them. Lack of adequate information provides a legitimate case for a judgment of involuntary exposure to risk. But of course information itself can be obtained at some cost, pecuniary or otherwise. We are thus dealing, in cases of this kind, with high costs of risk avoidance, in the distinctive form of high costs of acquiring relevant information.

Second, suppose that people who are exposed to a certain risk are aware of the risk, but are not in an actual or potential contractual relation with the risk-producer. Many victims of pollution are in this position; recall that in surveys air pollution is a particular source of public concern. People in Los Angeles may well know that they face high levels of smog. Are they exposed involuntarily? If we conclude that they are, we may mean that a risk is incurred involuntarily when and in the sense that it is typically very expensive for people to avoid it—and when someone else can reduce the risks more cheaply. Here a claim that the risk is faced “involuntarily” may mean that those who “run” the risk can reduce it only at very high cost, at least compared to those who “produce” the risk. (The quotation marks are necessary for obvious Coasian reasons.) Or it is possible that we mean that on nonutilitarian grounds, the people exposed to the risk have a moral entitlement to be free from it, at least if they have not explicitly sold it.

But turn now to a third class of cases, involving a wage package or contract that does include compensation for the relevant risks. Assuming that point, we might want to distinguish between two different possibilities. In a case of a high-level scientist, knowledgeable about relevant risks and involved in work that he

finds rewarding, people may well conclude that we have an instance of voluntariness. (In the same category can be found the case of an astronaut.) But people might not say the same about a low-level worker who does not like his work at all (cf. Anderson, 1993). What distinguishes the two cases? If knowledge is present, or if the compensation package includes payment for the relevant risk, it is not clear how the two differ. The underlying judgment must be that the compensation is inadequate, perhaps because background inequality has produced a wage package that seems unfair even if voluntarily chosen by the parties.

From this discussion it seems reasonable to speculate that any judgment that a risk is run “involuntarily” is probably based on 1) a lack of knowledge of the risk, or, more accurately, high costs of obtaining information about the risk, 2) a belief that information to one side, it would be very costly for people to avoid the risk, or 3) a belief that the risk is unaccompanied by compensating benefits, notwithstanding their belief that the contract is in some sense worth signing. It may seem hard to make sense of 3); what might be at work is a judgment that background inequalities are producing the relevant bargain (not by itself a good reason to disrupt the deal), or perhaps a belief that workers are competing to their collective detriment, and an agreement not to compete would be in their best interests. On this view, the question whether a risk is run voluntarily or not is often not a categorical one but instead a question of degree, associated with information cost, risk-reduction cost, and the existence or not of accompanying benefits. Of course there are interesting background questions about why and when a risk “codes” as voluntary or involuntary; undoubtedly the answer depends a great deal on heuristic devices and selective attention.

c. The purpose for which the risk is incurred and problems of responsibility and blame

Death-risks may seem “voluntarily” run when people do not approve of the purpose for which people run the relevant risks, and involuntarily run when people think that the purpose for which the risk is run is laudable. It is predictable that people will not want to pour enormous taxpayer resources into lowering the risks associated with sky-diving, even if the dollars/life-years saved ratio is quite good. By contrast, it is doubtful that people think that it is wrong to

spend enormous resources on the prevention of death from childbirth or being a police officer, even though the decision to have a child is (with appropriate qualifications) voluntary, and so too with the decision to become a police officer. People may think that when the appeal or purpose of the activity is associated with its very riskiness, resources should not be devoted to risk-reduction. At least this is plausible when the risk is an independent good or part of the benefit of the activity. And it is easy to imagine a belief that some activities—unsafe sex, cigarette smoking—are like the sky-diving case, perhaps because the risk is sometimes part of the benefit, perhaps because the risks are not incurred for a purpose that observers find worthy or valuable.

It might seem that this consideration—the purpose for which the risk is incurred—overlaps with or is even identical to the question whether there are high costs of risk-avoidance. When the costs are low, as in sky-diving, the purpose might seem inadequate. But on reflection the two ideas are hardly the same. It may well be that failing to sky-dive, or sky-diving with some safety-increasing technology, imposes high costs on sky-divers. There seems to be an objective judgment, not necessarily connected with subjective costs, in the claim that some risks are voluntary, or deserve less attention, because they are run for inadequate purposes.

Relatedly, airplane accidents may seem different from automobile accidents not because the former are less voluntary, and not because of diverse costs of risk avoidance, but because the victims of airplane accidents are less blameworthy than the victims of automobile accidents, in the sense that the death is not a product of their own negligence or misconduct. In the case of an airplane disaster, weather conditions, mechanical failure, or pilot error are likely causes; in the case of an automobile accident, it is more likely (though not of course certain) that the victim could have avoided death through more careful driving. The point is crude, since many victims of automobile accidents are not drivers, and many drivers in accidents do not behave negligently. But the perceived difference, in a significant number of cases, may underlie an apparent judgment of “voluntariness” that is really a judgment about responsibility and blameworthiness. In any case judgments are likely to be affected, and distorted, by the fact that drivers seem to be risk optimists—with 90% ranking themselves as safer than the average driver and less

likely to be involved in an accident.⁶¹ This is another place—illusions of control and risk optimism—where cognitive psychology argues in favor of cost-benefit analysis.

d. Underlying questions and assumption of risk

We might therefore conclude that whether a risk qualifies as involuntary raises many of the questions raised by the question whether government should regulate the market at all. A risk might be characterized as involuntarily run because affected people lack relevant information; because the transactions costs of bargaining are high; because the risks should be seen to amount to externalities; because collective action problems make market outcomes unsatisfactory since (for example) workers are in a prisoner's dilemma best solved through law; or because some motivational or cognitive defect makes successful solutions through markets unlikely. These of course are among the conventional grounds for regulation in the first instance. When a risk seems voluntary, and not worthy of substantial regulatory resources, the term "voluntary" is serving as a placeholder for an argument that there is no sufficient ground for government action, because the accompanying benefits are high or the risk-reduction costs are low, and because market arrangements take adequate account of these facts.

Should voluntarily run risks of death receive no public attention, on the ground that the relevant people have already received compensation? We might imagine a death-risk to be incurred voluntarily when an informed person decided to incur it in light of its costs and benefits. Suppose, for example, that someone purchases a small car with fewer safety features, or decides to become a boxer, an astronaut, or a police officer in a dangerous neighborhood. If a death results from such a choice, it might seem that the chooser has no legitimate ground for complaint; there has been *ex ante* compensation for the risk. But even in such cases, it is not clear that government lacks a role. If government can reduce a serious risk at low cost, and thus eliminate deaths, it should do so even if there was *ex ante* compensation for the relevant risk. There is a general point here. Sometimes observers confuse two quite different questions: (1) Should people be banned from running a certain risk, when they

⁶¹ See Shelley E. Taylor, *Positive Illusions* 10 (1994).

have run that risk voluntarily? (2) Should government attempt to reduce a certain risk, when people have run that risk voluntarily? A negative answer to question (1) does not answer question (2).

From this point we should conclude that a lay judgment that a risk is “voluntary” should not be decisive. A better understanding of what factors underlie and support that judgment should be used for purposes of regulatory policy. The basic criterion of decently livable life years might, then, be adjusted upward when those at risk lack relevant information or when the costs of risk-avoidance are especially high—or downward when those at risk have the information and when the costs of risk-avoidance are low.

3. Ripple Effects

The psychological evidence suggests, though it does not squarely identify, an important and relevant fact: Some deaths produce unusually high externalities, in the sense that they generate widespread losses, including those stemming from empathy and fear, in a way that leads to predictable pecuniary and nonpecuniary costs. Consider, for example, the death of the President of the United States, a death that imposes a wide range of costs and that taxpayers invest significant resources to prevent. Part of the reason for allocating those resources is undoubtedly the greater risk that the President will be murdered; but the external costs associated with his death are undoubtedly important too. A parallel can be found in the relatively large level of resources devoted to prevent the assassination of many important public officials. But the point is hardly limited to the highest public officials. An airplane hijacking or crash, partly because it is likely to be well-publicized, may produce large externalities in the form of empathy and fear. It may even deter air travel by making people unusually frightened of air travel, simply because of heuristic devices (availability) and other predictable factors that make people’s probability assessments go awry. This fear may be damaging because it is itself a utility loss and because it may lead people to use less safe methods of transportation, such as automobiles. Or an airplane crash might be especially disturbing because the sudden loss of dozens or hundreds of people seems so unusually and senselessly tragic, in a way that produces large empathetic reactions, or because it signals the further possibility of

random, apparently inexplicable events in which large numbers of people die.

Some catastrophes are especially disturbing because they appear to produce pointless and especially unnatural deaths. A recent airplane crash in Israel, killing over seventy soldiers, is an example, producing an extended period of national mourning—stemming from the youth of those who were killed, the fact that they were serving their country, and the highly unusual character of the accident, apparently stemming from preventable human error. These considerations suggest that special attention might justifiably be devoted to air safety in the time following a crash even if the relevant precautions do not cause a significant drop in deaths. The same idea may justify special safeguards of nuclear reactors. Even a minor and harmless accident may produce a kind of day-to-day fearfulness that properly places a role in an official calculus, at least if educative efforts cannot work against public fears to the extent that they are irrational or based on error-producing heuristic.

Special public concern about catastrophic events may thus reflect a judgment that certain kinds of deaths have ancillary effects, well beyond the deaths themselves. Consider in this regard the “Buffalo Creek Syndrome,” documented several times in the aftermath of major disasters. Nearly two years after the collapse of a dam that left 120 dead and 4000 homeless, psychiatric researchers continued to find significant psychological and sociological changes; survivors were characterized by a loss of direction and energy, other disabling character changes, and a loss of communality.⁶² One evaluator attributed this loss of direction specifically to “the loss of traditional bonds of kinship and neighborliness.”⁶³ The non-linearity of lay evaluations of risk in the context of potential disasters may thus reflect a high premium on avoiding the distinctive kinds of losses distinctly associated with catastrophes. If so, differences between lay and expert assessments rest on genuine value differences

⁶² Daniel Fiorino, Technical and Democratic Values in Risk Analysis, 9 Risk Analysis 293 (1989).

⁶³ Daniel Fiorino, Technical and Democratic Values in Risk Analysis, 9 Risk Analysis 293, 295 (1989). See also J.D. Robinson, M.D. Higgins, & P.K. Bolyard, Assessing Environmental Impacts on Health: A Role for Behavioral Science, 4 *Envir. Impact Assessment Rev.* 41 (1983).

(four times as many deaths may be much more than four times as bad) rather than on factual errors in cognitive processes of ordinary people.

These various points raise a number of questions. We do not yet have a full understanding of the basis for special public concern with catastrophes. Moreover, the argument for devoting special resources to deaths with externalities is strongest when the externalities do not reflect irrationality or cannot be reduced through other means. For example, some of the fear that follows certain widely reported deaths is based on confusion or ignorance about actual probabilities; if it is possible to dispel the confusion, the fear should dissipate as well. Here the question is whether government can legitimately spend extra resources to avert the harms associated with irrational public attitudes. Perhaps information-based strategies would be preferable to allocating additional resources to deaths whose occurrence produces widespread panic. On the other hand, there are undoubtedly instances in which information is ineffective, and there are also cases in which high externalities, in the form of special fear, are not a product of factual ignorance. In such cases government is justified in giving additional resources to death-prevention.

4. Inequitable Distribution

Some risks might be, or be thought to be, inequitably distributed, above all because the victims are disproportionately members of socially disadvantaged groups. Certain deaths might, for example, be concentrated among poor people, African-Americans, or homosexuals. Consider the risk of lead paint poisoning suffered by inner city children, or the risk of AIDS, faced disproportionately by African-Americans as well as homosexuals. Citizens or elected representatives may think that inequitably distributed risks of death deserve special attention from government. Here the relevant deaths are bad not because each one is especially bad to experience, but because there is social concern about the fact that a certain cause of death falls disproportionately on members of certain social groups.

When such social concern exists, and when it is not objectionable on constitutional or other grounds, it is entirely legitimate for officials to respond.⁶⁴ Thus regulators should be

⁶⁴ It is inadequate to respond that potential compensation could be made to

permitted to use a uniform number per life or life-years saved; this is itself a (modest) redistributive strategy, because wealthy people (simply because they are wealthy) are willing to pay more to reduce risks than nonwealthy people. Regulators might also be permitted to give *distributional weights* to risks whose distributional incidence is especially troublesome.⁶⁵ These weights might take a technical form (through adding numbers to the ones that would otherwise be used) or appear via the official judgment about how to proceed after the cost-benefit analysis has been supplied (through deciding in favor of a strategy not strictly suggested by the numbers). The distributional concern supports special efforts to control AIDS; environmental risks like asthma, which are concentrated among inner city children; and perhaps the spread of diseases whose incidence is concentrated among women. My minimal claim is that if there is a public judgment in favor of according a distributional weight to a certain death-reduction policy, and if that judgment is not unconstitutional or otherwise illegitimate, policy makers should not be barred from respecting that judgment.

5. *No Rival Rationality*

I conclude that there is no “rival rationality,” and that people are willing to depart from the “lives saved” criterion for reasons that cast a clearer light on what it is that they are attempting to maximize. More particularly:

- a. People are willing to pay a premium to avoid deaths that involve a high degree of pain and suffering. At least presumptively, this desire, or judgment, should be respected by government regulators; the presumption might be rebutted if, for example, the “premium” seems so high as to suggest that some kind of irrationality is at work.
- b. People are willing to devote more resources to protect children. This judgment may depend on a belief that children are typically more vulnerable to risk, in the

losers in the context of efficient programs; if the compensation is only potential, the concern remains.

⁶⁵ See the critical comments about willingness to pay in Amartya Sen, *The Discipline of Cost-Benefit Analysis*, *J. Legal Stud.* (forthcoming 2000), and in Matthew Adler and Eric A. Posner, *J. Legal Stud.* (forthcoming 2000).

sense that they cannot protect themselves, or on a belief that more life-years are at stake when children are in jeopardy. In either case, this judgment too deserves respect.

c. People are willing to pay a premium to avert catastrophes. This may depend on a belief that catastrophes have “ripple effects” that outrun lives actually lost. A plane crash killing 100 people may be worse than 100 deaths from poor diet, if the consequence of the former is to create pervasive fear and anxiety. A shooting in a high school may warrant special attention, keeping lives saved constant, if only in order to ensure that students and parents are not constantly fearful about the safety of schools. These “ripple effects” qualify as social costs and at first glance seem to deserve special attention. The major qualification is that it may be possible to address them directly, rather than to cater (pander?) to them. Suppose, for example, that education can assure the public that flying is generally quite safe. If information can accomplish this end, it is better to provide it than to engage in regulation that is costly and that has no purpose other than to reassure.

d. People are willing to devote more resources to protect against dangers when the costs of risk avoidance are high. Perhaps people do not have information about certain risks, and perhaps information is costly to obtain. Perhaps third parties are in danger, and perhaps it is costly for them to avoid the danger. This point may involve fairness; it may involve efficiency. It involves fairness if people believe that those who bear high costs from risk avoidance should not, in principle, have to bear those costs. If this is the underlying belief, then it may follow that those who can easily avoid the cost of some risk should, in principle, do exactly that. The point involves efficiency if the judgment is that the best means of reducing aggregate costs (public as well as private) is to regulate the entity that is imposing the relevant risk.

e. People may believe that it is especially important to protect vulnerable or traditionally disadvantaged groups against certain risks. If, for example, AIDS is concentrated

among African-Americans and homosexuals, there may be a special reason to devote resources to its prevention, even if quantitatively identical risks receive less attention.

These various points suggest that there is no “rival rationality.” The question is whether people believe that some dangers deserve more attention than (quantitatively identical) others, and if so, whether that belief can survive critical scrutiny. But these points also suggest that it is wrong to think that policy should follow the judgments of experts focussed on the single question of “lives at stake.”⁶⁶ This is not the social maxim and for reflective citizens. Such citizens have a different view about what their government ought to be doing. That different view does not embody any exotic conception of rationality.

III. An Incompletely Theorized Agreement on Cost-Benefit Analysis?

A. Problems With Aggregated Willingness to Pay

Thus far I have suggested that cost-benefit analysis is a sensible approach to cognitive problems faced by ordinary people in the assessment of risk. I have also suggested that there is no democratic objection to using cost-benefit analysis as an ingredient in decisions, even a crucial ingredient, and that cost-benefit analysis can be understood in a way that responds to reasonable concerns about quantification and about the idea that the only thing to be maximized is total lives saved (or, somewhat better, life-years saved).

But none of this deals with the general question how cost-benefit analysis should be understood. In the least contentious formulation—the formulation that I have used here—cost-benefit analysis is simply a form of open-ended consequentialism, an invitation to identify the advantages and disadvantages of regulation,⁶⁷ an invitation that does not say anything about

⁶⁶ This is the apparent recommendation in Margolis, *supra* note, though I am not sure that Margolis would agree with what I am suggesting here.

⁶⁷ See Amartya Sen, *The Discipline of Cost-Benefit Analysis*, *J. Legal Stud.* (forthcoming 2000); compare the notion of cost-benefit analysis as a decision procedure in Matthew Adler and Eric A. Posner, *Rethinking Cost-Benefit*

appropriate weights. The virtue of this formulation is that it is uncontentious; the vice is that it is vacuous. People can agree with it, but it does not mean anything. In its most contentious formulation, cost-benefit analysis depends on asking people how much they are “willing to pay” for various goods, and making decisions depend on the resulting numbers.⁶⁸ Problems with this approach lie in a possible lack of private information; its possible distributional unfairness (since willingness to pay depends on ability to pay); potential differences between private willingness to pay and public aspirations⁶⁹; and collective action problems of various sorts that might draw into doubt the privately-expressed amounts.⁷⁰ It will be worthwhile to spell out these points in a bit more detail.

“Willingness to pay” is a simple way to capture people’s valuations, and for this reason it has practical advantages. Indeed, it is a good place to start, especially in the absence of anything better. But it also suffers from several problems. *First*, willingness to pay may be a product of cognitive and motivational distortions of various kinds. Willingness to pay judgments may be insufficiently informed or reflective with respect to both facts and values. For example, people may overstate the risks from various hazards that receive disproportionate media attention. If this is so, it seems odd to base government policy on those judgments.

It is also possible that people will be willing to pay little to avoid some bad X simply because they are used to it and their preferences have adapted accordingly.⁷¹ For example, people may not care about scenic areas simply because they have not been exposed to them. Preferences based on lack of information or adaptation to deprivation are hardly a good basis for regulatory policy. They need not be taken as given and translated into law. In any case private

Analysis, 109 Yale L.J. (forthcoming 1999).

⁶⁸ See Richard A. Posner, *Economic Analysis of Law* (5th ed. 1998).

⁶⁹ See Daphna Lewinson-Zamir, *Consumer Preferences, Citizen Preferences, and the Provision of Public Goods*, 108 Yale L.J. 377 (1999); Cass R. Sunstein, *Free Markets and Social Justice* ch. 2 (1997).

⁷⁰ See Daphna Lewinson-Zamir, *Consumer Preferences, Citizen Preferences, and the Provision of Public Goods*, 108 Yale L.J. 377 (1999); Amartya Sen, *Environmental Evaluation and Social Choice: Contingent Valuation and the Market Analogy*, 46 Japanese Econ. Rev. 23, 29 (1995).

⁷¹ See Sen, *supra*; Jon Elster, *Sour Grapes* (1983).

preferences may be a product of social norms over which individuals have little control, by which they live, but which they would like to change if they could. If people are willing to pay little to avoid some risk (for example, of smoking) because of prevailing norms that they would wish changed, willingness to pay is unjustified as a basis for policy, since the norm could be changed through collective action.⁷²

Second, willingness to pay is imperfectly correlated with utility—at best the first is a proxy for the second—and the two should not be confused in principle. One problem is that poor people are willing to pay less than wealthy people simply by virtue of being poor, and their willingness to pay for something (eg, a reduced mortality risk) is crudely connected with the utility that they would gain from it. In the face of disparities in wealth, willingness to pay should not be identified with expected utility or with the value actually placed on the good in question.⁷³ *Third*, there is a purely distributive concern.⁷⁴ Because poor people have less money than wealthy people, they are willing to pay less for equivalent goods (such as reduced risks to life). The result of the use of willingness to pay would be to produce greater expenditures to protect wealthy people than poor people, a controversial result to say the least.⁷⁵ *Fourth*, the willingness to pay criterion will produce losers as well as winners, and many of the losers will go uncompensated; it is scant comfort to say that they *could* be compensated with side payments or a system of optimal taxation. Hence an attempt to defend cost-benefit analysis by reference to the efficiency criterion, as measured by private

⁷² See Cass R. Sunstein, *Free Markets and Social Justice* ch. 2 (1997).

⁷³ This seems to me a mistake in Viscusi's illuminating discussion, W. Kip Viscusi, *Risk Equity*, *J. Legal Stud.* (forthcoming 2000).

⁷⁴ This is a standard point in economic discussions of cost-benefit analysis, though it is ignored in many discussions by economic analysts of law. See, e.g., Richard Tresch, *Public Finance: A Normative Theory* 541 (1981): "In our opinion the distributive question is the single most important issue in all of cost-benefit analysis." Tresch discusses how distributional considerations might be incorporated. See also A. Allan Schmid, *Benefit-Cost Analysis* 157-190 (1989), with a discussion of distributive weights at pp. 170-72.

⁷⁵ At least unless poor people are compensated for any losses via side payments.

willingness to pay, runs into great difficulties, at least unless steps are taken to ensure against distributional bias.⁷⁶

Fifth, and finally, there may be differences between the choices people make as consumers and the choices that they make as citizens, and it is not clear that the former should be preferred. The context of citizenship may evoke other-regarding or altruistic values, or preferences, that are not reflected in private choices. This is partly because aggregating private willingness to pay can replicate various collective action problems faced in the private domain; people may be willing to pay more simply because they know that other people are contributing as well.⁷⁷ If this is so, it makes no sense to base policy on private willingness to pay, where the collective action problem arises.

In any case we might think that government policy should be based on the reasons given for one or another outcome, and the fact that people are “willing to pay” a lot or a little for some outcome tells us too little about whether good reasons exist. Before discussion, for example, people may be willing to pay a fair bit to discriminate on the basis of sex, and they may be willing to pay little to protect large populations of animals that are at risk. These judgments may change as a result of reason-giving in the public domain. In other words, government is a place for exchanging reasons for one or another course or action. It is not simply a maximizing machine, taking private willingness to pay as the foundation, whatever the source or the grounds of pre-discussion preferences.

⁷⁶ There are some complexities here. Of course markets are ordinarily based on willingness to pay, and poor people are willing to pay less for safety, simply because they have less. Poor people are willing to pay less, as a class and other things equal, for safer cars, safer neighborhoods, and so forth. The aggregated willingness to pay approach simply generalizes this phenomenon; there is nothing unusual about it. Thus a system that assigns uniform values to life embeds a kind of subsidy, or redistribution, to people with relatively less resources or, more precisely, to people with less willingness to pay. A system of uniform values might be thought sufficient to correct any distributional bias in cost-benefits analysis.

⁷⁷ See Robert H. Frank, *Choosing the Right Pond: Human Behavior and the Quest for Status* (Oxford University Press) (1985); Lewinsohn-Zamir, *supra*; Amartya Sen, *supra*; Cass R. Sunstein, *Free Markets and Social Justice* (1997).

A particular problem here is that people may not want to spend a great deal to protect (for example) environmental amenities because they seek to protect their (relative) financial position.⁷⁸ A regulatory program supported by all might maintain relative position, which may be what people care about. Current willingness to pay numbers do not take account of this possibility. There is thus good reason for an empirical speculation here, one that suggests that current numbers are far too low. Much further work remains to be done to test whether people would in fact be willing to spend more for safety, or for environmental amenities, if the result would be significant decreases in absolute income but the same relative income.

Nor would it be sensible to disregard the presence of tragic choices, as when cost-benefit analysis leads to a choice of course A over course B, but course A leads to uncompensated losers (a group whose members may suffer from serious illnesses and even death).⁷⁹ Perhaps it is possible, in such cases, to restructure social arrangements so as to reduce or eliminate the tragedy. But even if this is so, a cost-benefit analysis, of the sort to be described, can help inform a decision about what tragedy-reducing course to take, and whether such a course is worthwhile at all.

B. Incomplete Theorization: Cost-Benefit Analysis As Political, Not Metaphysical

Often it is possible to resolve hard questions of law and policy without resolving deeply contested issues about justice, democracy, or the appropriate aims of the state.⁸⁰ Often it is possible to obtain an incompletely theorized agreement on a social practice, and even on the social or legal specification of the practice. In many areas of law and public policy, people can reach closure about what to do despite their disagreement or uncertainty about why, exactly, that ought to do it. Thus people who disagree about the purposes of the criminal law can agree that rape and murder should be punished, and

⁷⁸ See Frank, *supra* note.

⁷⁹ See Martha C. Nussbaum, *The Fragility Of Goodness: Luck and Ethics In Greek Tragedy and Philosophy* (1983); Martha Nussbaum, *J. Legal Stud.* (forthcoming 2000).

⁸⁰ See Cass R. Sunstein, *Legal Reasoning and Political Conflict* (1996); Cass R. Sunstein, *One Case At A Time* (1999).

punished more severely than theft and trespass. Thus people can support an Endangered Species Act amidst disagreement about whether the protection of endangered species is desirable for theological reasons, or because of the rights of animals, plants, and species, or because of the value of animals, plants, and species for human beings. A great advantage of incompletely theorized agreements is that they allow people of diverse views to live together on mutually advantageous terms. An even greater advantage is that they allow people of diverse views to show one another a high degree of both humility and mutual respect.

I believe that incompletely theorized agreement is possible here; at least this should be the goal of those attempting to understand the uses of cost-benefit analysis in regulatory policy. For reasons just discussed, it would be difficult to obtain agreement on the view (which seems to me implausible) that all questions of regulatory policy should be resolved by asking how much people are “willing to pay” for various social goods.⁸¹ But my basic claims here are that it should be possible for diverse people to agree on presumptive floors and ceilings for regulatory expenditures, and that the presumptions can do a great deal of useful work for policymaking and for law. In short, a great deal can be done without confronting the hardest theoretical questions raised by contentious specifications of cost-benefit analysis.

An obvious question here is: Who could join this incompletely theorized agreement? Who would reject it? My principal claim is that the agreement could be joined by a wide range of reasonable people, including utilitarians and Kantians, perfectionist and political liberals, and those who accept and those who doubt the idea that private willingness to pay is the appropriate foundation for regulatory policy. There is room here for deliberative democrats who emphasize the need for government to reflect on private preferences, rather than simply to translate them into law.⁸² A prime purpose of the

⁸¹ See Matthew Adler and Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 *Yale L.J.* (forthcoming 1999).

⁸² Absolutists of various kinds might refuse to join an agreement on these principles. Perhaps their refusal would be most reasonable in the case of the Endangered Species Act, where nothing said below explains why millions of dollars should be spent (at least in opportunity costs) to save members of ecologically unimportant species. It would be possible, however, to imagine a

approach is to ensure more in the way of reflection; cost-benefit analysis, as understood here, is a guarantee of greater deliberation, not an obstacle to it. Nor is the approach rigid. Under the proposed approach, agencies have the authority to abandon the floors and ceilings if there is reason for them to do so. If, for example, agencies want to spend a great deal to protect African-American children from a risk disproportionately faced by them, they are entitled to do so, as long as they explain that this is what they are doing, and so long as what they are doing is reasonable.

C. Eight Propositions

Here, then, are eight propositions, offered in the hope that they might attract support from diverse theoretical standpoints. I do not attempt to defend them in detail here; The goal is to provide a starting point for the effort to anchor cost-benefit analysis in an incompletely theorized agreement about regulatory policies.

1. *Agencies should identify the advantages and disadvantages of proposed courses of action, and also attempt to quantify the relevant effects to the extent that this is possible.* When quantification is not possible, agencies should discuss the relevant effects in qualitative terms, and also specify a range of plausible outcomes, e.g., annual savings of between 150 and 300 lives, or savings of between \$100 million and \$300 million, depending on the rate of technological change. The statement should include the full range of beneficial effects. The problem of particulates and ozone regulation poses some serious difficulties to challengers to cost-benefit analysis (CBA); if the EPA is not to do a form of CBA, what is it to do, concretely?

kind of "meta" cost-benefit analysis that would point in this direction, perhaps on the ground that it greatly simplifies decision without imposing high costs overall. For the regulatory issues dealt with here, an absolutist approach seems hard to justify, not least because there are dangers to life and health on both sides of the equation. Note that I am dealing here with environmental and related risks, and hence many of the most contentious issues (e.g., how to treat the wrongdoer's motivation, or how to deal with rights violators) do not arise. See Sen, *The Discipline of Cost-Benefit Analysis*, *supra*.

2. *The quantitative description should supplement rather than displace a qualitative description of relevant effects.* Both qualitative and quantitative descriptions should be provided. It is important to know the nature of the relevant effects, e.g., lost workdays, cancers averted, respiratory problems averted. To the extent possible, the qualitative description should give a concrete sense of who is helped and who is hurt, e.g., whether the beneficiaries are mostly or partly children, whether the regulation will lead to lost jobs, higher prices, more poverty, and so forth. Where the only possible information is speculative, this should be noted, along with the most reasonable speculations.

3. *Agencies should attempt to convert nonmonetary values (involving, for example, lives saved, health gains, and aesthetic values) into dollar equivalents.* This is not because a statistical life and (say) \$5 million are the same thing, but to promote coherence and uniformity and to ensure sensible priority-setting. There is nothing magical or rigid about the dollar equivalents; the conversion is simply a pragmatic tool to guide analysis and to allow informed comparisons.

4. *Agencies entrusted with valuing life and health should be controlled, by statute or Executive Order, via presumptive floors and ceilings.* For example, a statute might say that a statistical life will ordinarily be valued at no less than \$2 million and no more than \$10 million. Evidence of worker and consumer behavior, suggesting a valuation of between \$5 million and \$7 million per statistical life saved, is at least relevant here. The fact that the willingness to pay numbers are in this range is hardly decisive, but it is supplemented by the fact that similar numbers appear to represent the midpoint of agency practice. Thus both market and governmental measures point in the same basic direction.⁸³ OMB should establish presumptive floors

⁸³ Note, however, that if relative position is what matters, these numbers may be too low, for reasons stated above.

and ceilings for various regulatory benefits. If an agency is going to spend (say) no more than \$500,000 per life saved, or more than \$20 million, it should have to explain itself. Actual agency practice reveals a mixed record. EPA now values a life at \$4.8 million; some agencies go as high as \$5.6 or as low as \$1; and some agencies do not provide specific numbers at all.

5. *Agencies should be permitted to adjust the ceilings and floors, or to choose a low or high end of the range, on the basis of a publicly articulated and reasonable judgment that such an adjustment or such a choice is desirable.* Perhaps adjustments could be made if, for example, poor people are especially at risk. There should be no adjustments “downwards” for poor people; in other words, the fact that poor people are willing to spend less to protect their own lives (because they are poor) should not call for a correspondingly lower expenditures by government. The principal danger here is that well-organized groups will be able to use equitable arguments on behalf of their preferred adjustments. It is important to ensure a degree of discipline here, and perhaps the dangers of interest-group manipulation are serious enough to suggest that uniform numbers or ranges might be used, or that the presumptions are strong and rebuttable only in the most compelling cases.⁸⁴

6. *Agencies should be permitted to make adjustments on the basis of the various “qualitative” factors discussed above.* For example, they might add a “pain and suffering premium,” or increase the level of expenditure because children are disproportionately affected or because the victims are members of a disadvantaged group. It would be reasonable to conclude that because AIDS has disproportionate adverse effects on homosexuals and poor people, special efforts should be made to ensure against AIDS-related deaths. To the extent possible, they should be precise about the nature of, and grounds for, the

⁸⁴ See Viscusi, Risk Equity, *supra* note.

relevant adjustments, especially in light of the risk that interest-group pressures will convert allegedly qualitative adjustments in illegitimate directions.⁸⁵

7. *The appropriate response to social fear not based on evidence, and to related “ripple effects,” is education and reassurance rather than increased regulation.* Sometimes public concern about certain risks is general and intense, even though the concern is not merited by the facts.⁸⁶ The best response is educational; the government should not expend significant resources merely because an uninformed public believes that it should. But if education and reassurance fail, increased regulation may be defensible as a way of providing a kind of reassurance in the face of intense fears, which can themselves impose high costs of various kinds. (Consider, for example, the possibility that people who afraid of risks of plane crashes will shift to driving, a more risky method of transportation; consider also the fact that the fear is itself a cost.)

8. *Unless the statute requires otherwise, judicial review of risk regulation should require a general showing that regulation has produced more good than harm, on a reasonable view about valuation of both benefits and costs.*⁸⁷ On this view, courts should generally require agencies to generate and to adhere to ceilings and floors. But they should also allow agencies to depart from conventional numbers (by, for example, valuing a life at less than \$1 million, or more than \$10 million) if and only if the agency has given a reasonable explanation of why it has done so. The ultimate task would be develop a kind of “common law” of cost-benefit analysis, authorizing

⁸⁵ See *id.*; see also James Hamilton and W. Kip Viscusi, *Calculating Risks* (1999) (showing that allegedly equitable shifts are driven by political pressures not mapping onto any sensible conception of equity).

⁸⁶ See Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 *Stan. L. Rev.* 683 (1999).

⁸⁷ See Margolis, *supra* note.

agencies to be law-making institutions in the first instance.⁸⁸

IV. Conclusion

I have suggested that cost-benefit analysis, often defended on economic grounds, can be urged less contentiously on cognitive grounds. Cost-benefit analysis, taken as an inquiry into the consequences of varying approaches to regulation,⁸⁹ is a sensible response not only to interest-group power, but also to limited information and to predictable problems in the public demand for regulation. These problems include the use of the availability heuristic; social amplification of that heuristic via cascade effects; a failure to see the benefits that accompany certain risks; a misunderstanding of systemic effects, which can lead to unanticipated bad (and good) consequences; and certain emotional reactions to risks. In all of these areas, an effort to identify costs and benefits can properly inform analysis.

These points do not show how cost-benefit analysis should be specified. Here I have raised questions about the willingness to pay criterion and suggested that at least in principle, it would be obtuse to attempt to assess regulatory proposals via a uniform number for lives saved; but I have also suggested that presumptive ranges, for life as well as other beneficial effects on health and other values, would be an excellent way to clarify and order regulatory policy, in a way that should lead both to greater consistency and more overall protection. If ordinary market behavior and ordinary government behavior point to a similar basic range (e.g., \$3 million to \$7 million per life saved), that is an excellent place to start.

My ultimate hope is that it would be possible to produce a convergence on a form of cost-benefit analysis that should be understood as a pragmatic instrument and that ought not to be terribly contentious—a form of cost-benefit analysis that does not

⁸⁸ This has started to happen in various areas. See the development of a common law of “risk significance” under OSHA, discussed in Cass R. Sunstein, *Is the Clean Air Act Unconstitutional?*, *Michigan Law Review* (forthcoming 1999).

⁸⁹ There is no alternative to regulation. What is sometimes described as deregulation, or a failure to regulate, is actually regulation via the common law.

take a stand on highly controversial questions about what government ought to do, and that promises to attract support from people with diverse conceptions of the right and the good. I have suggested here that the most promising source of such an agreement is not only or even mostly neoclassical economics, but also behavioral economics and cognitive psychology.

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