TEMPLE LAW REVIEW

VOL. 87 NO. 3 **SPRING 2015**

ARTICLES

COST-BENEFIT ANALYSIS AS A COMMITMENT DEVICE

Matthew Wansley[*]

Cost-benefit analysis does not age well. As scientific understanding of health, safety, and environmental risks accumulates over time—and as the technology to mitigate those risks becomes more affordable—the assumptions underlying a rule's cost-benefit analysis obsolesce. Yet because of agency inaction, rulemaking ossification, and inattention to priority setting, outdated rules persist. In order to combat obsolescence, agencies should use cost-benefit analysis as a commitment device. When an agency analyzes a rule, it should precommit to subsequently adopting a more stringent rule than the one it initially promulgates, if and when a private actor credibly demonstrates that the stricter rule has become cost-benefit justified. Using cost-benefit analysis as a commitment device would (1) more accurately calibrate rules over time, (2) induce innovation in risk-mitigating technologies by signaling to investors that future regulation would create demand, (3) improve the adversarial dynamic of the rulemaking process by encouraging innovator firms to defect from entrenched anti-regulatory coalitions, and (4) reorient the way administrations and agencies set regulatory priorities. Cost-benefit analysis has been used to constrain regulation, but it can—and should—be used to compel regulation and expedite the regulatory state's reduction of risks over time.

* Climenko Fellow and Lecturer in Law, Harvard Law School. I thank Jake Gersen, Mike Klarman, Will Ortman, Todd Rakoff, and Cass Sunstein for comments. I thank Pat Gavin and Ben Gifford for research assistance. All errors are mine.

TABLE OF CONTENTS

INTRODUCTION

Cost-benefit analysis purports to calibrate regulation. But the way administrative agencies practice cost-benefit analysis can, at best, calibrate a rule at the moment of its promulgation. As scientific knowledge of regulated health, safety, and environmental risks accumulates over time—and as the technology to mitigate those risks becomes more affordable—the assumptions underlying a rule's cost-benefit analysis can rapidly obsolesce. Because of the structural incentives towards agency inaction, pressure from regulated firms, or, simply, attention to other priorities, outdated rules persist.

The basic idea of cost-benefit analysis—the claim that regulators should select a rule by weighing its expected costs and benefits—does not entail that regulators should later ignore how a rule's actual costs and benefits have diverged from expectations. The problem is what I call *snapshot* cost-benefit analysis: the administrative state's practice of treating regulation as a one-off game by neglecting to adapt a rule when the best estimate of its costs and benefits has changed.

Cost-benefit analysis need not work this way. For many health, safety, and environmental regulations, cost-benefit analysis could—and should—be used as a commitment device. When an agency analyzes the costs and benefits of a proposed rule, it should explicitly anticipate the adoption of a more stringent rule than the one it promulgates. The agency should then precommit to adopting the more stringent rule when a credible demonstration has been made that it has become cost-benefit justified. Just as the *expected* costs and benefits of a rule determine its initial level of stringency, the *observed* costs and benefits of a rule should determine when and how it is updated.

Health, safety, and environment regulation should be organized as a project to gradually reduce risks when reductions become cost-benefit justified over time. Consider the history of lead regulation.[1] At least by the early years of the twentieth century, industry and scientists were aware that lead posed serious risks to human health.[2] In 1921, "the president of the National Lead Company had acknowledged in a letter . . . to the dean of the Harvard Medical School that 'lead is a poison when it enters the stomach of man.'"[3] But at that time,

1. *See* DAVID MICHAELS, DOUBT IS THEIR PRODUCT: HOW INDUSTRY'S ASSAULT ON SCIENCE THREATENS YOUR HEALTH 38–44 (2008); *see also* GERALD E. MARKOWITZ & DAVID ROSNER, DECEIT AND DENIAL: THE DEADLY POLITICS OF INDUSTRIAL POLLUTION (2002) (examining the dangers of lead poisoning that spurred regulation); CHRISTIAN WARREN, BRUSH WITH DEATH: A SOCIAL HISTORY OF LEAD POISONING (2001) (chronicling the social history of lead poisoning and lead regulation).

2. *See* MICHAELS, *supra* note 1, at 38 ("By the early part of the twentieth century [lead] was both widely utilized and widely known as hazardous to our health."); *see also* MARKOWITZ & ROSNER, *supra* note 1, at 7 ("Industry was well aware of the dangers of lead throughout the nineteenth century.").

3. MICHAELS, *supra* note 1, at 40 (quoting Letter from Edward J. Cornish, President, Nat'l Lead Co., to David Edsall, Dean, Harvard Med. Sch. (1921)). Michaels also recounts that "[e]ven the GM researcher who developed Ethyl [the compound in leaded gasoline] soon took a leave of absence to recover from lead poisoning." *Id.*

epidemiologists did not understand what blood-lead *levels* were harmful—they relied on clinical symptoms to determine whether a patient was a victim of lead poisoning.[4]

It took decades of research for physicians to realize that blood-lead levels formerly seen as innocuous were dangerous. As late as

> 1950, doctors had no interest in treating children whose blood-lead levels were as much as three times higher than those that today prompt aggressive "deleading." In fact, average blood-lead levels for urban children then were close to those pediatricians now routinely treat with powerful drugs, levels that cause parents to fear that lead exposure may have impaired their children's mental health.[5]

If the regulation of lead had seamlessly tracked the scientific understanding of the risks it posed, there would have been early, but limited, regulation, gradually tightened as epidemiologists became aware that lower blood-lead levels caused significant health harms.[6] That is roughly the story that is told in some accounts of the history. For example, in a 1978 opinion affirming a new standard for occupational lead exposure, Chief Judge J. Skelly Wright explained that "[a]s scientific means for measuring lead exposure and lead absorption have improved over the last 50 years, scientists and the government have set lower and lower figures for the maximum tolerable level of airborne lead exposure, but have struggled in setting a precise permissible exposure limit."[7]

But a closer look at the history reveals that the process to regulate lead—and then gradually tighten those regulations—was a more uneven struggle. Long after it was aware that lead posed serious health risks, the lead industry continued to publicly deny those risks.[8] Attempts to regulate lead paint, which poisons children who ingest paint chips,[9] exemplify the lag between scientific knowledge and regulatory response. Manufacturers had been phasing out lead paint for reasons unrelated to health by the 1940s.[10] But the first meaningful regulation of lead paint did not come until 1971, when President Nixon signed

4. *See* WARREN, *supra* note 1, at 5 ("At the beginning of the century, lead poisoning was defined by clinical symptoms, not quantitative measures. Improvements in the ability to measure small quantities of lead in body fluids or tissues radically altered lead-poisoning epidemiology.").

5. *Id.* at 1–2.

6. *See* MICHAELS, *supra* note 1, at 192 ("In 1991, on the basis of evidence reported in chapter four, the Centers for Disease Control and Prevention (CDC) lowered the definition of what was considered an elevated blood level of lead, a highly toxic metal, in children from 30 to 10 μg/dl (micrograms per deciliter of blood). Today the CDC's best estimate is that more than 300,000 under the age of six have exposures exceeding that target level, and new studies indicate that even lower exposure levels may affect children's learning." (footnote omitted).

7. United Steelworkers v. Marshall, 647 F.2d 1189, 1204 (D.C. Cir. 1980).

8. *See* MARKOWITZ & ROSNER, *supra* note 1, at 7 ("The most cynical response of the lead industry to reports of danger was a fifty-year advertising campaign to convince people that lead was safe, and most insidiously, to target its marketing campaign specifically to children.").

9. *See* MICHAELS, *supra* note 1, at 38–39 ("Blood lead levels greater than 70μg/dl (or micrograms per deciliter of blood), generally from eating paint chips, can cause seizure, coma, and death in children.").

10. *Id.* at 39.

the Lead-Based Paint Poisoning Prevention Act,[11] which restricted lead paint in federally funded housing.[12] Broader restrictions were added in the next few years, but lead paint was not effectively banned until 1976.[13]

Regulators also sought to ban leaded gasoline, and industry resisted aggressively. In a hearing before the Senate in 1966, a public relations firm representing leaded gasoline interests "emphasize[d] that the only people who needed regulatory protection were lead employees and that the standard in effect at the time, 80 μg/dl, was sufficient."[14] The Environmental Protection Agency (EPA) gave notice that it would regulate in 1972, and industry sued.[15] The D.C. Circuit affirmed the EPA's decision, reasoning that regulatory

> agencies, unequipped with crystal balls and unable to read the future, are nonetheless charged with evaluating the effects of unprecedented environmental modifications, often made on a massive scale. Necessarily, they must deal with predictions and uncertainty, with developing evidence, with conflicting evidence, and, sometimes, with little or no evidence at all.[16]

But leaded gasoline was not banned as a matter of law until the Clean Air Act Amendments of 1990, which went into effect in 1995.[17]

David Michaels, who heads the Occupational Safety and Health Administration (OSHA), has described the regulation of leaded gasoline as a success story:

> Between 1976 and 1991 lead essentially disappeared from gasoline in this country. This is why our children and especially our grandchildren will be smarter than we are. As a *direct* result, the average blood lead level of children between the ages of one and five years declined by more than 80 percent, a change directly attributable to the elimination of leaded gasoline. Preschool-aged children in the United States in the late 1990s had IQs that were, on average, 2.2–4.7 points higher than the comparable group two decades earlier. In terms of productivity and higher income, the effects are huge: Government researchers estimate that the economic value of this increased intelligence is between $100 and $300 billion dollars for each age cohort (i.e., all of the kids born in the United States in a single year).[18]

Michaels is right—for its time, lead *was* a regulatory success story. But that lead regulation is considered a success story demonstrates how low expectations

11. Lead-Based Paint Poisoning Prevention Act, Pub. L. 91-695, Title IV, § 401, 84 Stat. 2079 (1971) (codified as amended at 42 U.S.C. § 4831 (2012)).

12. MICHAELS, *supra* note 1, at 39.

13. *Id.*

14. *Id.* at 42.

15. *Id.* at 43.

16. Ethyl Corp. v. EPA, 541 F.2d 1, 6 (D.C. Cir. 1976).

17. MICHAELS, *supra* note 1, at 44; *see also* Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (1990) (codified as amended at 42 U.S.C §§ 7407–7583 (2012)) .

18. MICHAELS, *supra* note 1, at 44; *see also id.* at 38 ("[W]ith the health hazards posed by lead the newly empowered regulatory system actually worked—haltingly and over the bitter opposition of the industry.").

are for health, safety, and environmental regulation. The slow pace of lead regulation imposed dramatic costs to society. In 1984, the director of the Center for Disease Control's Center for Environmental Health stated "that 'if no lead had been allowed in gasoline since 1977, there would have been approximately 80 percent fewer children identified with lead toxicity.'"[19] Less lead toxicity would have meant higher educational achievement, greater productivity, and—if recent studies on the lead-crime link are confirmed[20]—fewer violent felonies.

Early lead regulation predated the era of cost-benefit analysis,[21] but even a smoothly functioning regime of snapshot cost-benefit analysis might not have changed this history much for the better. Because epidemiologists did not initially understand what levels of lead exposure caused what health risks, a well-executed cost-benefit analysis would have resulted in speculative and unreliable cost and benefit predictions, possibly dramatically understating the benefits of more stringent regulation. Whatever rule was selected might have persisted long after its level of leniency ceased to be cost-benefit justified, as the scientific assessment of the risks of exposure to smaller amounts of lead grew, and lead replacement and abatement technologies were developed. The uncertainty surrounding when, if ever, the rule would have been updated undoubtedly would still have reduced the incentive to invest in technologies that could have justified the adoption of more stringent regulation.

But one can imagine a different story in a future in which the administrative state regulated a lead-like risk using cost-benefit analysis as a commitment device.[22] The agency's initial cost-benefit analysis might still suffer from the same paucity of scientific knowledge and risk-mitigating technologies. But the rulemaking would be more forward-looking. In addition to selecting a rule to be promulgated, the regulatory agency would anticipate and precommit to a second, more stringent rule, one that prohibited exposure at levels permitted under the rule to be promulgated. The agency would then specify how a private actor could trigger a reanalysis by credibly demonstrating that its innovation—like unleaded gasoline, lead-free paint, or lead-abatement technology—could bring the cost of compliance down to justify the more stringent rule.

The agency precommitment would induce the private sector to invest in technologies that could compel the more stringent regulation. Not all firms that used the regulated chemical in their products and processes would continue to resist regulation. Some firms would find they stood to gain a competitive

19. *Id.* at 44 (quoting *Airborne Lead Reduction Act: Hearing on S. 2609 Before the S. Comm. on Env't and Pub. Works*, 98th Cong. 25 (1984)) (statement of Vernon Houk, Director, Center for Environmental Health, Centers for Disease Control, Public Health Service).

20. *See, e.g.*, Howard W. Mielke & Sammy Zahran, *The Urban Rise and Fall of Air Lead (Pb) and the Latent Surge and Retreat of Societal Violence*, 43 ENVT. INT'L 48 (2012); Rick Nevin, *Understanding International Crime Trends: The Legacy of Preschool Lead Exposure*, 104 ENVTL. RES. 315 (2007); Jessica Wolpaw Reyes, *Environmental Policy as Social Policy? The Impact of Childhood Lead Exposure on Crime*, 7 B.E. J. ECON. ANALYSIS & POL'Y 1 (2007).

21. Cost-benefit analysis was first introduced in 1981. *See* Exec. Order No. 12,291, 3 C.F.R. § 127 (1982) (revoked 1993).

22. See *infra* Part II.C for an overview of cost-benefit analysis as a commitment device.

advantage from stricter regulation. Ultimately, a private actor might discover the innovation that justified the new rule and triggered the reanalysis.

The reanalysis would be automatic. As long as the private actor seeking to trigger the reanalysis had credibly demonstrated that the anticipated rule had become justified, the agency would be compelled to conduct the reanalysis. The focus of the reanalysis would be narrow: the rulemaking would be limited to considering new information on the costs and benefits of the regulation, taking the predictions from the initial cost-benefit analysis as presumptions. The anticipated, more stringent rule would serve as the rulemaking's proposed rule, and it likely would be adopted. After all, the rulemaking would not have happened had the rule's justification not appeared credible.

If the agency adopted the anticipated rule, it would anticipate and precommit to an even more stringent rule for the next iteration of reanalysis. The agency would not *always* adopt the anticipated rule. The reanalysis could, for example, reveal that compliance costs with the initial rule had been underestimated or that industry had substituted a regulated chemical with an even more harmful unregulated chemical and that this unforeseen cost outweighed the benefits of further regulation. In that instance, the agency might retain the existing rule or even adopt a less stringent one. Alternatively, the reanalysis could reveal that, for example, initial compliance costs were exaggerated or that switching production processes had also decreased workplace accidents. In that case, the agency might adopt a rule even more stringent than the anticipated one.

So reanalyses would be *partially* predetermined. Private actors would have enough confidence about what information would be relevant to the reanalyses that they could reasonably estimate the likelihood that the agency would adopt the anticipated rule. But the reanalyses would not be so predetermined that they would result in rules that lacked cost-benefit justification.

It is plausible that, had lead been regulated over the past half century using cost-benefit analysis as a commitment device, the public's exposure to lead would have been reduced in a cost-justified way through more quickly tightened rules and more rapid innovation in lead replacement and abatement technologies. But the relative success of lead regulation may be atypical. Lead regulations *were* ultimately tightened as political pressure grew, because lead is such a high-profile and easily observable killer. Many, if not most, health, safety, and environmental risks, however, remain below the political radar and languish unregulated or regulated at insufficiently low levels. Relying on political pressure to set regulatory priorities and spur agency action is a risky strategy.

Cost-benefit analysis as a commitment device could help agencies and administrations set priorities better.[23] Administrations could set a standard figure for the difference in expected benefits (DEB) between promulgated and anticipated rules for agencies to use in setting anticipated rules. If every rule were set using the same DEB, the expected costs and benefits of updating each

23. See *infra* Section V for a discussion of how cost-benefit analysis as a commitment device would improve the process of setting agency and administration priorities.

rule would drive when that rule was reanalyzed and revised. A well-executed DEB might have pushed agencies charged with regulating lead risks to have updated lead-related rules more quickly as the risks of exposure to small amounts of lead became clearer and lead replacement and abatement technologies developed. It also might have caused administrations to reallocate more resources to lead-regulating agencies as administrations observed those agencies spending increased time and resources updating lead regulations.

But, critically, it *might not* have done so. Perhaps the salience of lead in our intuitive toxicology makes it sound like more of a threat and therefore more worthy of agency and administration time and resources than it merits. The insight of cost-benefit analysis is that regulatory decisions should be based on the best available evidence of the expected effects of proposed rules, even when that evidence conflicts with our unreliable intuitions. The case for the commitment device is that the best available evidence of costs and benefits should also guide when agencies update rules and how administrations set priorities.

In recent years, the administrative state has started to move beyond snapshot cost-benefit analysis. The centralized Office of Information and Regulatory Affairs (OIRA) has made significant efforts to standardize cost-benefit analysis across agencies.[24] In 2011, President Obama issued an executive order mandating that agencies adopt policies for retrospective analysis—reviewing existing regulations to determine whether initial cost and benefit predictions had proven accurate.[25] Agencies have begun to adopt retrospective analysis policies and review existing regulations.[26]

The commitment device would push the administrative state past retrospective analysis. Its aim is not simply to collect information on cost and benefit predictions, but to induce technological developments that would render even clairvoyant predictions outdated.[27] While retrospective analysis defers to agency discretion in implementation, the commitment device directly addresses the problems of rulemaking ossification and agency inaction.

Using cost-benefit analysis as a commitment device would not address all criticisms raised against cost-benefit analysis.[28] In fact, critics who take the view that costs and benefits of regulation are impossible to quantify—or ought not be quantified—might find the prospect of incorporating cost-benefit analysis into decisions about when agencies should act, or how administrations should set

24. *See* Michael A. Livermore & Richard L. Revesz, *Regulatory Review, Capture, and Agency Inaction*, 101 GEO. L.J. 1337, 1371–72 (2013) (explaining how OIRA contributes to the standardization of cost-benefit analysis) [hereinafter Livermore & Revesz, *Regulatory Review*].

25. *See* Exec. Order No. 13,563, 3 C.F.R. §§ 215, 217 (2011), *reprinted in* 5 U.S.C. § 601 app. at 816–17 (2015) ("To facilitate the periodic review of existing significant regulations, agencies shall consider how best to promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned.").

26. See *infra* note 110 for examples of these policies.

27. See *infra* Section III for a discussion of how the commitment device would fix failures in the market for innovation.

28. See *infra* Section VI for a response to the prevailing criticisms of cost-benefit analysis.

priorities, even less appealing than a regime of snapshot cost-benefit analysis.[29] But much of the criticism of cost-benefit analysis derives from its history—it was, after all, deliberately conceived as an anti-regulatory tool.[30] Many critics today concede that quantification is at least sometimes helpful, but maintain that cost-benefit analysis has more often than not served to constrain rather than calibrate regulation.[31]

Cost-benefit analysis as a commitment device addresses some of these more moderate criticisms. It would reorient cost-benefit analysis so that it compelled regulation as much as it constrained regulation—by making reanalysis more frequent and automatic, by giving some firms pro-regulatory incentives, and by pushing the tightening of existing regulations to the top of regulatory priorities. Cost-benefit analysis would still raise considerable theoretical and practical objections, but the commitment device would remove some of the powerful objections that apply only to snapshot cost-benefit analysis.

The case for the commitment device proceeds in six Sections. Section I describes the causes of regulatory obsolescence. Section II explains how cost-benefit analysis works now and how it could be used as a commitment device. Section III argues that a commitment device would fix failures in the market for risk-mitigating technologies. Section IV contends that it would deossify the rulemaking process. Section V analyzes how the commitment device would reform agency and administration set regulatory priorities. Section VI engages earlier academic debates over cost-benefit analysis and defends the Vigilance Principle, a new vision for thinking about health, safety, and environmental regulation as a project to gradually reduce risks over time.

I. THE PROBLEM OF OBSOLETE RULES

This Section describes the general problem of technological obsolescence in law and the more specific problem of regulatory obsolescence in contemporary administrative law. All forms of law struggle to adapt to technological change. Lawmakers face an inherent tradeoff between the specificity and the durability of a law's commands. Even the common law, heralded for its adaptability, does not self-update seamlessly.

29. *See, e.g.*, FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 8 (2004); Steven Kelman, *Cost-Benefit Analysis: An Ethical Critique*, REG., Jan.–Feb. 1981, at 33, 38. *But see* ACKERMAN & HEINZERLING, *supra*, at 39–60 (documenting overestimates of regulatory costs). For a related, but distinct, criticism, see, for example, DOUGLAS A. KYSAR, REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY 119 (2010) ("The most worrying danger presented by cost-benefit analysis is not that we will choose the wrong modeling assumptions, but that the full power and responsibility of our collective agency will become lost amidst the rhetorical force of an interest-aggregation exercise that purports to take account of all relevant consequences of social choice.").

30. *See, e.g.*, RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 25–27 (2008) [hereinafter REVESZ & LIVERMORE, RETAKING RATIONALITY].

31. *See, e.g.*, KYSAR, *supra* note 29, app. at 256–57 (outlining a limited role for cost-benefit analysis in a hypothetical environmental statute).

Administrative regulation, because of its specificity, is especially brittle. The current system of administrative rulemaking in the United States exacerbates this brittleness in two ways. First, regulated firms have taken advantage of its procedural protections to ossify the rulemaking process. Second, there is a structural bias towards agency inaction because courts aggressively scrutinize newly promulgated rules and rarely and deferentially review failures to promulgate rules.

A. The General Problem of Technological Obsolescence in Law

The common law is an instructive example of the problem of technological obsolescence in law because it is reputed to be comparatively well suited to adapt to change. Guido Calabresi, for example, has emphasized the partially—but not fully—determinative quality of common law precedent as the source of the common law's adaptability.[32] Under the common law, he argued, "[c]hange occurred because the doctrine of *stare decisis* was adhered to in a relatively loose fashion and precedents were not, even nominally, ultimately binding."[33]

The economic account of tort law might be understood to suggest that the common law can adapt to technological developments efficiently. According to the Learned Hand formula, a defendant breaches a duty of care if the defendant's cost of taking precautions is less than plaintiff's expected loss, the product of the magnitude of the loss and its probability.[34] Each of those three variables—the cost of precautions, the magnitude of the plaintiff's loss, and the probability of that loss—is technology dependent. As technology changes, then, the standard of negligence should change in response. For example, in the case of automobile collisions, the state of vehicle technology, road safety technology, and medical technology will all affect the calculation of those variables. As collisions become more or less costly or preventable, and courts gain more accurate knowledge about those costs, the duty of care defendants owe should change accordingly.

But the history is more complicated. Richard Posner has suggested that common law courts have been reluctant to update arguably obsolete doctrine.[35] In an article testing his claim that the common law negligence doctrine is efficient with accident cases from 1875 to 1905,[36] Posner found that his sample

> contain[ed] no case in which an enterprise was held to have been negligent for having failed to introduce a safety method or appliance not generally in use in the industry. All kinds of safety appliances were introduced during the period embraced by the sample: in railroading alone, there were the automatic coupler, the air brake, the steel car,

32. *See generally* GUIDO CALABRESI, A COMMON LAW FOR THE AGE OF STATUTES (1982).

33. *Id.* at 4.

34. *See* United States v. Carroll Towing Co., 159 F.2d 169, 173 (2d Cir. 1947) ("[I]f the probability be called P; the injury, L; and the burden, B; liability depends upon whether B is less than L multiplied by P: i. e., whether B < PL.").

35. *See* Richard A. Posner, *A Theory of Negligence*, 1 J. LEGAL STUD. 29, 74 (1972).

36. *See id.* at 34–36 (explaining his study's methods).

> steel rails, the electric block system for preventing collisions, and many others. The safety standard is higher at the end of the period than at the beginning but there is no evidence that the law of negligence had anything to do with raising it.[37]

The explanation Posner offered for this apparent failure to update is an institutional incentive towards inaction:

> There was a natural reluctance to permit a jury or even a series of juries to decide that the railroad industry, not just one backward line, should be investing very substantial sums in an unproven and inevitably controversial new appliance: the air brake was much derided in railroading circles when it was first invented.[38]

So why do safety precautions improve over time if negligence law is not requiring them? Posner attributed the adoption of newer precautions to market forces. "There are few areas, certainly in railroading," he stated, "where the introduction of a safety appliance would benefit only third parties, whose injuries an enterprise will take account of only if forced to do so by the state."[39] Therefore, he concluded, "[i]ndustry had strong incentives, wholly apart from liability, for introducing air brakes and this is true of most other safety appliances."[40]

Posner's description of the conditions under which the market created sufficient incentives to adopt risk-reducing technologies in turn-of-the-century railroading suggests that market forces alone will not protect the public from most of the risks that contemporary health, safety, and environmental regulation cover. Many of the health risks we regulate, most prominently cancer, can take decades to detect, and consumers often face an information asymmetry about the extent of the risk.[41] Environmental risks often take the form of externalities, and, especially in the case of climate change, the harm these risks cause will be suffered in later generations.[42] Exposure to health, safety, and environmental risks is also not evenly distributed,[43] and those consumers and workers most in need of protection may be the ones with the fewest market options.

If Posner's historical example is representative, then Calabresi's praise for the common law's adaptability should be tempered. Technological obsolescence is a hard problem for all forms of law because updating law depends on the incentives of lawmaking institutions.

---

37. *Id.* at 74.

38. *Id.* at 74–75.

39. *Id.* at 75.

40. *Id.*

41. *See* MARKOWITZ & ROSNER, *supra* note 1, at 138 (illustrating the information asymmetry between industry and consumers on the cancer risks of plastics).

42. See, for example, KYSAR, *supra* note 29, at 150–75 for a discussion of the ethical complexities involved in the effects of climate change on future generations.

43. *See, e.g.*, Alice Kaswan, *Environmental Justice: Bridging the Gap Between Environmental Laws and "Justice"*, 47 AM. U. L. REV. 221, 232 (1997) (reporting that the race and income of adjacent residents predicts the siting of hazardous facilities).

B. The Specific Problem of Regulatory Obsolescence

Regulation is especially susceptible to obsolescence because its commands are so specific and detailed. As Calabresi sonorously put it, over time, "[s]lowly the requirements of specific types of seatbelts, bumpers, and so on, shift from being costly charges imposed on manufacturers to being hurdles for innovators who believe they have developed a better, cheaper way of achieving the same degree of safety."[44]

The specific problem of regulatory obsolescence in contemporary administrative law has two additional institutional causes: the ossification of the rulemaking process and the structural bias towards agency inaction.[45] Both of these causes are products of the interaction between judicial doctrines and the disproportionate influence of regulated firms.[46]

Rulemaking ossification grew out of the procedural protections encoded in the Administrative Procedure Act (APA).[47] The APA gives interested persons a right to notice and comment on rulemakings.[48] The APA, in the words of one scholar, is the "victim of its own success":

> Because [rulemaking] was initially so efficient in forewarning individuals and groups forewarning about how the agency was planning to affect them, it has provided powerful political constituencies with ample opportunity to mobilize against individual rulemaking initiatives. The political battleground has thus shifted from the legislature to the bureaucracy. When rulemaking is aimed at advancing progressive social agendas, regulatees and their trade associations have fiercely resisted the rulemaking process, seeking to lard it up with procedural, structural, and analytical trappings that have the predictable effect of slowing down the agency.[49]

Regulated firms can use the threat of judicial challenge to impede the progress of rules they disfavor. The APA provides that courts shall "hold

---

44. CALABRESI, *supra* note 32, at 47.

45. Another potential cause of regulatory obsolescence is statutory obsolescence. *See, e.g.*, Jody Freeman & David B. Spence, *Old Statutes, New Problems*, 163 U. PA. L. REV. 1, 5 (2014) ("Congress has not passed a major environmental statute in nearly a quarter-century . . . despite dramatic technological, economic, and social changes in these fields that would seem to demand a legislative response."). In particular, they list a series of specific environmental statutes they contend should be updated. *Id.* at 17–18.

46. Calabresi reasoned:

> Why then doesn't the agency change the rules? . . . The first [reason] is obviously the direct pressures on the agency from those who benefit from the old rules. . . . Since the regulator, like the regulated, will also have grown up believing that compliance with the past regulation is the public interest, the likely result is easily forecast without resort to speculations about evil people.

See CALABRESI, *supra* note 32, at 47–48.

47. *See generally* 5 U.S.C. §§ 500–559, 701–706 (2012).

48. *See id.* § 553(b) (notice provision); *id.* § 553(c) ("[T]he agency shall give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity for oral presentation.").

49. Thomas O. McGarity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 DUKE L.J. 1385, 1397 (1992) (footnotes omitted).

unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," among other bases.[50] The courts conduct arbitrary and capricious review through the less-than-deferential "hard look" doctrine.[51] An exhaustive literature debates the effects and desirability of judicial review of agency action under the hard look doctrine, but there is some evidence that it meaningfully inhibits agency action and contributes to rulemaking ossification.[52]

Even if regulated firms are not able to halt agency action altogether, they can often profit from delay. Courts will sometimes vacate a rule and remand it to the agency for revision, allowing firms to postpone compliance while the agency attempts to revise the rule in light of the court's objections to the earlier rulemaking.[53]

As a result of the threat of judicial review, "[t]he key to successful rulemaking is therefore to make every effort to render the rule capable of withstanding the most strenuous possible judicial scrutiny the first time around."[54] The time and resources agencies must devote to that end reduce the likelihood that existing rules will ever be updated, especially if the industry coalition that fought the rule initially has become entrenched.[55]

50. 5 U.S.C. § 706(2).

51. See for example Kathryn A. Watts, *Proposing a Place for Politics in Arbitrary and Capricious Review*, 119 YALE L.J. 2, 14–23 (2009), for a brief history. The "hard look" doctrine became solidified in *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983). But see *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 513–17 (2009), for a more recent, and arguably more deferential, application of the doctrine. For a summary of the normative debate in the context of a descriptive account of the doctrine, see Matthew C. Stephenson, *A Costly Signaling Theory of "Hard Look" Judicial Review*, 58 ADMIN. L. REV. 753, 757–67 (2006).

52. *See, e.g.*, William S. Jordan, III, *Ossification Revisited: Does Arbitrary and Capricious Review Significantly Interfere with Agency Ability to Achieve Regulatory Goals Through Informal Rulemaking?*, 94 NW. U. L. REV. 393, 393–94 (2000) ("[I]t has become a virtual article of faith that judicial review of agency rules under the current hard look version of the 'arbitrary, capricious, or abuse of discretion' standard has been a major culprit in the 'ossification' of informal rulemaking." (footnote omitted) (quoting 5 U.S.C. § 706(2)(A) (1994)). Attempts to test the ossification thesis empirically have been inconclusive. *See* Richard J. Pierce, Jr., *Rulemaking Ossification Is Real: A Response to* Testing the Ossification Thesis, 80 GEO. WASH. L. REV. 1493 (2012); Jason Webb Yackee & Susan Webb Yackee, *Testing the Ossification Thesis: An Empirical Examination of Federal Regulatory Volume and Speed, 1950–1990*, 80 GEO. WASH. L. REV. 1414 (2012).

53. Remand with vacatur used to be the default result after a court struck down a rule. *See* Richard J. Pierce, Jr., *Seven Ways to Deossify Agency Rulemaking*, 47 ADMIN. L. REV. 59, 75 (1995) ("Until the 1990s, a reviewing court routinely vacated and remanded an agency rule if the court held the rule arbitrary and capricious because of the agency's failure to comply with the duty to engage in reasoned decisionmaking."). But now, courts will sometimes remand without vacating the rule. *See, e.g.*, Am. Forest Res. Council v. Ashe, 946 F. Supp. 2d 1, 44 (D.D.C. 2013) ("After an agency rule or order has been found unlawful on the merits, the decision whether to vacate or remand without vacatur depends on: (1) 'the seriousness of the order's deficiencies (and thus the extent of doubt whether the agency chose correctly),' and (2) 'the disruptive consequences of an interim change that may itself be changed.'" (quoting Allied–Signal, Inc. v. U.S. Nuclear Regulatory Comm'n, 988 F.2d 146, 150–51 (D.C. Cir. 1993)).

54. McGarity, *supra* note 49, at 1401.

55. McGarity proposed to solve the ossification problem by, inter alia, making it easier for private actors to stimulate rulemaking and for agencies to adopt "tentative rules." *See id.* at 1436–62.

The separate, but related, problem of agency inaction results from an asymmetry in the incentives judicial review creates for agencies. Although agency action faces demanding review under the hard look doctrine, agency inaction is rarely subject to judicial review. Since *Heckler v. Chaney*,[56] the Supreme Court has generally interpreted the relevant provisions of the APA to mean that agency inaction is nonreviewable.[57] The Court has also interpreted standing doctrine so as to preclude most possibilities for judicial review of agency inaction.[58]

The APA does provide the right for parties to petition an agency for a rulemaking.[59] But until recently, it was not clear that agency decisions to deny petitions for rulemaking were reviewable.[60] In 2007, the Supreme Court resolved that question in *Massachusetts v. EPA*,[61] in which a 5-4 majority held that the EPA had failed to justify its denial of a petition for rulemaking on greenhouse gases.[62] So denials of petitions for rulemaking—"a category of agency decision making that once enjoyed all the benefits of 'inaction'—will now be "treated as if it were 'action' and subjected to review."[63]

Under his system for tentative rules, "the original rule would provide that unless the agency completed a new rulemaking with a fresh round of notice-and-comment prior to a specified deadline, the rule would be automatically repealed. The agency would thus commit itself to revisit such rules periodically." *Id.* at 1460. McGarity acknowledged that his system would create problems for agency priority setting: "Tentative rulemaking could be quite burdensome if the agency were obliged to revisit every rule on a periodic basis. When the agency spends all of its resources scrambling to keep existing rules from expiring, it may not be able to get around to many new rulemaking initiatives." *Id.* Lynn Blais and Wendy Wagner built on McGarity's suggestions with two reform proposals. *See* Lynn E. Blais & Wendy E. Wagner, *Emerging Science, Adaptive Regulation, and the Problem of Rulemaking Ruts*, 86 TEX. L. REV. 1701, 1731–37 (2008). The first is "contemporaneous revision-planning," under which "agencies would evaluate during the original rulemaking process the degree to which technological innovation is likely to advance in the relevant field in the future." *Id.* at 1731. The second is "revision rulemaking," which involves "a special petition process that triggers revisions in a one-way, more stringent direction when a petitioner establishes that there is a clearly available and reasonably affordable pollution-control device that accomplishes more dramatic reductions than the existing standard." *Id.* at 1734–35. The priority-setting problem is especially acute under Blais and Wagner's proposals because a technology that offers any improvement in reducing risk over existing technologies could trigger a revision, provided the new technology was "reasonably affordable." *Id.* at 1735.

56. 470 U.S. 821 (1985).

57. *See* Lisa Schultz Bressman, *Judicial Review of Agency Inaction: An Arbitrariness Approach*, 79 N.Y.U. L. REV. 1657, 1664–69 (2004); *see also Heckler*, 470 U.S. at 837.

58. *See* Bressman, *supra* note 57, at 1669–75.

59. *See* 5 U.S.C. § 553(e) (2012) ("Each agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule.").

60. *See* Jody Freeman & Adrian Vermeule, Massachusetts v. EPA: *From Politics to Expertise*, 2007 SUP. CT. REV. 51, 78 (2007) ("Is a rejection of a rulemaking petition reviewable at all? Before [*Mass. v. EPA*], the law on these questions was surprisingly unclear, especially at the level of the Supreme Court.").

61. 549 U.S. 497 (2007).

62. *Massachusetts*, 549 U.S. at 534–35.

63. Freeman & Vermeule, *supra* note 60, at 97.

Massachusetts v. EPA was an exceptional case.[64] In its aftermath, agencies still face comparatively less pressure to avoid inaction, and they are reluctant to begin—or especially, to reopen—controversial rulemakings and face onerous judicial review.[65] So once an agency promulgates a rule and that rule survives judicial challenge, it will likely linger in the Code of Federal Regulations long after its cost-benefit calibration ceases to be accurate.

Taken together, the rulemaking ossification and agency inaction problems have locked many health, safety, and environmental regulations into technological obsolescence, exacerbating regulation's inherent susceptibility to obsolescence. Using cost-benefit analysis as a commitment device is a strategy for remedying regulatory obsolescence.

II. HOW COST-BENEFIT ANALYSIS WORKS AND COULD WORK

From 1981 to 2011, federal administrative agencies practiced snapshot cost-benefit analysis. Agencies would promulgate a rule if its expected benefits justified its expected costs based on the information available at the time of the rulemaking. Under snapshot cost-benefit analysis, cost-benefit analysis serves primarily as a constraint, a one-way check against unjustified rules. Since 2011, agencies have started to move beyond snapshot cost-benefit analysis by creating policies for retrospective analysis, reexamining existing rules in light of subsequent information on their actual costs and benefits.

This Section explains how snapshot cost-benefit analysis works and how retrospective analysis improved on that practice. It then offers the case for moving beyond retrospective analysis to cost-benefit analysis as a commitment device.

A. Snapshot Cost-Benefit Analysis

Although the rulemaking process is lengthy, the substance of cost-benefit analysis nonetheless resembles a snapshot: each stage of the rulemaking is designed to carefully assess the proposed rule's expected costs and benefits given existing technology.[66]

64. *See, e.g.*, Livermore & Revesz, *Regulatory Review*, *supra* note 24, at 1382 (explaining that successful cases similar to *Massachusetts v. EPA* are rare). For an argument that courts should be more deferential to agency inaction in certain circumstances, see generally Sharon B. Jacobs, *The Administrative State's Passive Virtues*, 66 ADMIN. L. REV. 565 (2014).

65. Administrative law scholars have proposed myriad solutions to the problem of agency inaction. *See, e.g.*, Bressman, *supra* note 57, at 1686–1714 (proposing doctrinal reforms); Glen Staszewski, *The Federal Inaction Commission*, 59 EMORY L.J. 369, 369 (2009) (calling for a new independent agency to investigate and review agency inaction); *see also* Sidney A. Shapiro & Rena Steinzor, *Capture, Accountability, and Regulatory Metrics*, 86 TEX. L. REV. 1741 (2008) (outlining a system of accountability metrics to combat, inter alia, agency inaction and rulemaking ossification).

66. Many health, safety, and environmental statutes do not require cost-benefit analysis, but most agencies that regulate those areas have nonetheless come to practice it. For a helpful summary of the gap between what form of cost consideration statutes mandate and the practice of cost-benefit analysis, see CASS R. SUNSTEIN, THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION 12–15 (2002) [hereinafter SUNSTEIN, COST-BENEFIT STATE].

1. Information Acquisition

Agencies acquire and aggregate information on the likelihood and magnitude of harms created by various levels of risks to be regulated. Sometimes, this information can be represented in a dose-response curve, which shows the best estimate of the mathematical relationship between the level of exposure to a source of risk and the level of health harm it causes to those who are exposed.[67] This initial assessment of risks is often speculative, even if all parties offering information are acting in good faith. Untangling causation in epidemiology is notoriously difficult.[68] The shape of a dose-response curve sometimes cannot be estimated reliably when only the effects at higher doses have been studied.[69]

Agencies also acquire information relevant to predict the expected costs and benefits of the proposed rules, including the unintended but foreseeable effects of regulation. As with predictions about the expected harms of regulated risks, initial assessments of the expected effects of regulations are speculative. It is often difficult to predict what means industry will use to comply with regulations, and firms have little incentive to reveal this information.[70] For example, it can be difficult to predict how much the increased demand for risk-reducing technology will affect its market price.[71] In addition, although cost-benefit analyses often assume that regulated firms will adopt costly end-of-the-

67. *See* Cass R. Sunstein, *The Arithmetic of Arsenic*, 90 GEO. L.J. 2255, 2279–82 (2002) [hereinafter Sunstein, *Arithmetic*].

68. *See, e.g.*, MICHAELS, *supra* note 1, at 61–62 ("Except for a few very rare instances in which a disease is unique to an exposure, such as mesothelioma caused by asbestos, epidemiologists cannot state that a specific chemical exposure has definitely caused the cancer of a specific patient. . . . The best that epidemiology can provide is a probability statement. In fact, this is the essence of the field: establishing probabilities that reliably pertain to a given population.").

69. *See* Sunstein, *Arithmetic, supra* note 67, at 2279 ("It has long been recognized that a number of different mathematical models can fit a given set of dose-response data reasonably well, but produce vastly different predictions of risk when extrapolated to doses below the data range. Thus, extrapolated doses corresponding to '*de minimis*' risk levels can differ by several orders of magnitude, depending on the shape of the dose-response curve at low doses." (quoting Ralph L. Kodell, *U-Shaped Dose-Response Relationships for Mutation and Cancer*, 7 HUM. & ECOLOGICAL RISK ASSESSMENT 909, 910 (2001)).

70. *See* Cary Coglianese, Richard Zeckhauser & Edward Parson, *Seeking Truth for Power: Informational Strategy and Regulatory Policymaking*, 89 MINN. L. REV. 277, 290–91 (2004) [hereinafter Coglianese et al., *Truth for Power*] ("Firms usually have an interest in maintaining silence, in withholding or not even generating information that would help government regulate. After all, the more regulators learn about individual firms' technological capabilities, the more able they will be, all things being equal, to design and justify more stringent requirements later.") (footnote omitted).

71. *See, e.g.*, DAVID M. DRIESEN, THE ECONOMIC DYNAMICS OF LAW 27 (2012) [hereinafter DRIESEN, DYNAMICS OF LAW] ("[I]n estimating the cost of cleaning up pollution, regulators typically rely on past market prices for the technologies they expect private parties to use to clean up. This approach does not take into account a very frequent experience with regulation: a drop in price occasioned by innovation or simply competition among vendors of pollution control devices once a regulation creates demand for clean technology.").

pipe solutions, such as scrubbers for power plants, firms sometimes adapt by shifting production processes instead, which can be more affordable.[72]

In some instances, regulating one source of risk might create a different kind of risk or exacerbate another risk, giving rise to a "risk-risk tradeoff."[73] The tradeoff might involve a substitution effect, when regulated firms substitute a riskier activity in response to tighter regulation of a comparatively less risky activity. For example, tighter regulations on nuclear power might cause utilities to switch to fossil fuels.[74] Another potential tradeoff is known as the "lulling effect," which occurs when a misleading perception of increased security leads to less precaution.[75] For example, the Consumer Product Safety Commission's "introduction of [child-resistant] caps did not result in the expected diminishing in poisonings. Because of the difficulty of grappling with the caps, many parents left the caps off the bottles; indeed, almost 50 percent of poisonings resulted from open bottles."[76]

But it is a mistake—arguably one that the current practice of cost-benefit analysis makes too often—to assume that the foreseeable, but unintended effects of regulation are always costs rather than benefits. To take just one example, regulating conventional pollutants that coal power plants emit has the foreseeable benefit of reducing greenhouse gas emissions.[77] Any cost-benefit analysis worth defending will weigh foreseeable, but unintended benefits just as much as costs.

At least on paper, consideration of a proposed rule is supposed to include consideration of the rule's expected distributive effects. As early as 1993, agencies were instructed by Executive Order 12,866 to include "distributive impacts" and "equity" among the costs and benefits of proposed rules.[78] The current Executive Order contains similar language.[79] In some cases, agencies have given distributive effects significant weight in their analyses.[80]

The process of rulemaking does not resemble a disinterested search for the truth.[81] Firms that would be affected by the regulation as well as proponents of

72. *See* REVESZ & LIVERMORE, RETAKING RATIONALITY, *supra* note 30, at 135–37.

73. W. Kip Viscusi, *Regulating the Regulators*, 63 U. CHI. L. REV. 1423, 1449–50 (1996).

74. For other examples, see *id.* at 1449.

75. *Id.* at 1450 (internal quotation marks omitted).

76. *Id.*

77. REVESZ & LIVERMORE, RETAKING RATIONALITY, *supra* note 30, at 63–64.

78. Exec. Order No. 12,866 § 1(a), 3 C.F.R. § 638 (1993), *reprinted as amended in* 5 U.S.C. § 601 app. at 802–06 (2012).

79. Exec. Order No. 13,563, § 1(b), 3 C.F.R. § 215 (2012).

80. *See* Cass R. Sunstein, *The Office of Information and Regulatory Affairs: Myths and Realities*, 126 HARV. L. REV. 1838, 1866–67 (2013) [hereinafter Sunstein, *OIRA*] ("In the Obama Administration . . . nonquantifable benefits have in some cases been important."). Other difficult to quantify values are sometimes considered as well. *See, e.g.*, Rachel Bayefsky, Note, *Dignity as a Value in Agency Cost-Benefit Analysis*, 123 YALE L.J. 1732, 1755 (2014) (describing nonquantifiable benefits, such as avoiding stigma and humiliation, protecting safety, and enhancing independence for wheelchair users).

81. *See, e.g.*, DAVID M. DRIESEN, THE ECONOMIC DYNAMICS OF ENVIRONMENTAL LAW 31 (2003) [hereinafter DRIESEN, ENVIRONMENTAL] ("Industry has also falsified or distorted information

regulation have the incentive to distort the available information, and some have become adept at creating convenient uncertainty.[82] The adversarial character of rulemaking may serve the important goal of providing a fair hearing, but its effect on the accuracy of predictions of the expected harms of risks cannot be assumed to be positive.

2. Rule Selection

To some early proponents of cost-benefit analysis, inspired by an ideal of Kaldor-Hicks efficiency, rule selection resembles a utility optimization problem: an agency should select its rule at the point where the marginal costs of the rule equal its marginal benefits.[83] That vision of optimization has been thoroughly debunked by critics and proponents of cost-benefit analysis.[84] One problem with this reasoning is that it ignores the diminishing marginal utility of money, which prevents a direct translation of a cost-benefit analysis's dollar figures to aggregate individual utility functions.[85]

Cost-benefit analysis is better justified as a decision procedure.[86] As one defense of cost-benefit analysis puts it, "at least it is quite plausible to think that [cost-benefit analysis], suitably modified to function as a practicable decision-making tool, is welfare maximizing, as compared to currently available competitor procedures . . . across a wide range of governmental choice situations."[87]

The executive orders governing cost-benefit analysis have gradually moved away from optimization language. President Reagan's Executive Order mandating cost-benefit analysis stated that "[r]egulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh

to hide bad health effects when they are discovered."); MICHAELS, *supra* note 1, at 190 ("In virtually every instance in which a federal regulatory agency proposes protecting the public's health by reducing the allowable exposure to a toxic product, the regulated industry hires scientists to dispute the science on which the proposal is based.").

82. One particularly noxious tactic is the creation of captured journals that offer the veneer of peer review and publish anti-regulatory articles. *See* MICHAELS, *supra* note 1, at 53–55 (providing examples of captured journals).

83. *See, e.g.*, E.J. MISHAN, COST-BENEFIT ANALYSIS 382–402 (2d ed. 1976); *see also* Steve P. Calandrillo, *Responsible Regulation: A Sensible Cost-Benefit, Risk Versus Risk Approach to Federal Health and Safety Regulation*, 81 B.U. L. REV. 957, 991 (2001). Even Mishan later concedes that "distributional and other social goals have to be respected by the economist who offers advice to society. The least he should do is to point up the distributional implications wherever they appear significant." MISHAN, *supra*, at 405.

84. *See, e.g.*, MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 9–24 (2006); DRIESEN, ENVIRONMENTAL, *supra* note 81, at 16–22.

85. *See* ADLER & POSNER, *supra* note 84, at 23–24.

86. In a strict sense, the commitment device does not even require traditional cost-benefit analysis. It may be compatible with any system for quantifying the costs and benefits of regulation, including an interesting recent proposal for "well-being analysis." *See generally* John Bronsteen, Christopher Buccafusco & Jonathan S. Masur, *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 DUKE L.J. 1603 (2013) (proposing a new methodology for evaluating government policy—"well-being analysis"—as an alternative to cost-benefit analysis).

87. *See* ADLER & POSNER, *supra* note 84, at 62.

the potential costs to society" and that "[r]egulatory objectives shall be chosen to maximize the net benefits to society."[88]

The current Executive Order still states that agencies should "select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits," but the calculation of "net benefits" is understood to include "distributive impacts" and other costs and benefits that are "difficult to quantify."[89] Agencies are instructed to "propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify)."[90] Former OIRA Administrator Cass Sunstein calls this language "a clear recognition that even if the monetized benefits are lower than the monetized costs, the costs might nonetheless be justified."[91]

The optimization model of rule selection also bears little resemblance to the observed practice of cost-benefit analysis. For many rules, expected costs and benefits cannot reasonably be estimated with the precision of a single figure. They are better understood as cost and benefit ranges.[92] Therefore, the expected net benefits of a rule are best modeled as a probability range.[93] As a result, cost-benefit analysis is better understood as a procedure through which agencies select a rule for which the expected benefits range is equivalent or superior to the expected costs range.

3. Executive and Judicial Review

For any rule that qualifies as a "'significant' regulatory action"—generally rules that have an economic effect of at least $100 million—OIRA will review an agency's cost-benefit analysis.[94] Sunstein describes OIRA's role as follows:

> OIRA itself may offer views about how costs and benefits are most accurately assessed, and also about how best to proceed in light of the economic impacts. If the benefits of the agency's chosen approach do

88. Exec. Order No. 12,291, § 2(b)–(c), 3 C.F.R. § 127 (1982).

89. Exec. Order No. 13,563, § 1(b), 3 C.F.R. § 215 (2012).

90. *Id.*

91. Sunstein, *OIRA*, *supra* note 80, at 1865.

92. *See* Sunstein, *Arithmetic, supra* note 67, at 2257 ("Sometimes the best that can be done is to specify an exceedingly wide 'benefits range,' one that does not do a great deal to discipline judgment.").

93. *See* ADLER & POSNER, *supra* note 84, at 89.

94. Sunstein, *OIRA*, *supra* note 80, at 1850–51. "Significant regulatory action" is defined as

> any regulatory action that is likely to result in a rule that may: (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or (4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive order.

Exec. Order No. 12,866, 3 C.F.R. § 638 (1994).

> not appear to justify the costs, OIRA . . . will . . . raise questions about whether the agency should proceed with that approach.[95]

Critics have claimed that OIRA has been a "one-way ratchet against regulation . . . since its inception."[96] OIRA's defenders emphasize that most rules OIRA reviews are modified rather than withdrawn[97] and attribute much of these changes to interagency coordination, suggested revisions from agencies other than the agency that proposed the rule under review.[98] Of course, the mere threat of executive branch review may meaningfully influence agency behavior.[99]

Section I explained the pathologies of the next step—the omnipresent judicial challenge. What makes snapshot cost-benefit analysis deserve the label is what happens *after* judicial review concludes. The interaction between agencies and regulated firms is generally limited to enforcement and adjudication, and these interactions take for granted the persistence of existing rules.[100] In the past few years, however, that relationship has started to change with the rise of retrospective analysis.[101]

B. Retrospective Analysis

Retrospective analysis has the potential to improve on snapshot cost-benefit analysis by prompting agencies to reconsider existing regulations in light of new information. It is a first step towards using cost-benefit analysis as a commitment device. But moving to a commitment device system would be an ironic development: just as cost-benefit analysis itself was introduced as a means to deregulate, retrospective analysis was "[m]otivated above all by the general goal of streamlining the regulatory system."[102]

---

95. Sunstein, *OIRA*, *supra* note 80, at 1865 (footnote omitted). For a largely consistent account with a more skeptical spin, see Livermore & Revesz, *Regulatory Review*, *supra* note 24, at 1371–72 ("During the process of review, the OIRA staff, composed of regulatory generalists and specialists in cost-benefit analysis, also has the opportunity to spot and push back against analytic choices that are outside professional norms, which may be motivated by political goals.").

96. Nicholas Bagley & Richard L. Revesz, *Centralized Oversight of the Regulatory State*, 106 COLUM. L. REV. 1260, 1304 (2006).

97. Sunstein notes that, of the 2,304 regulations OIRA reviewed between January 21, 2009 and August 10, 2012, only 7% were withdrawn, although 76% were approved "'consistent with change,'" a broad category that includes both cosmetic and substantive changes. Sunstein, *OIRA*, *supra* note 80, at 1847.

98. *Id.* at 1848–50.

99. *See generally* Jennifer Nou, *Agency Self-Insulation Under Presidential Review*, 126 HARV. L. REV. 1755 (2013).

100. To some extent, however, agencies can substitute rulemaking and adjudication as policymaking means. *See generally* M. Elizabeth Magill, *Agency Choice of Policymaking Form*, 71 U. CHI. L. REV. 1383 (2004).

101. Regulations are also sometimes modified incrementally ex post by legislation. "Congress has provided for back-end adjustments in the form of deadline extensions and waivers, variances, and exceptions . . . ." Robert L. Glicksman & Sidney A. Shapiro, *Improving Regulation Through Incremental Adjustment*, 52 U. KAN. L. REV. 1179, 1187 (2004).

102. Cass R. Sunstein, *The Regulatory Lookback*, 94 B.U. L. REV. 579, 590 (2014) [hereinafter Sunstein, *Lookback*].

Retrospective analysis grew out of a one-off regulatory lookback that the Obama administration undertook while Sunstein led OIRA. Sunstein explains:

> [W]e believed that in a difficult economic period, there was a pressing need to eliminate unjustified requirements and to reassess rules on the books. . . . Changed circumstances can make rules ripe for reassessment and trimming, or maybe deletion. Perhaps new technologies make such rules obsolete. Perhaps there is a problem of redundancy and overlap. Perhaps states are also imposing requirements, and federal regulations are no longer needed. Perhaps the private market is now working well enough, and old regulations no longer have a point, because there is no market failure for them to address.[103]

Although the political impetus for the regulatory lookback was the perception of overburdened regulation in difficult economic times, retrospective analysis also drew on older academic criticisms of information deficits in administrative rulemaking.[104] Michael Greenstone, former chief economist of the Council of Economic Advisors, has prominently criticized cost-benefit analysis predictions as unreliable.[105] "The single greatest problem with the current system," Greenstone argued, "is that most regulations are subject to a cost-benefit analysis only in advance of their implementation. This is the point when the least is known and any analysis must rest on many unverifiable and potentially controversial assumptions."[106] This high-profile criticism influenced the adoption of retrospective analysis policies.[107]

In 2011, President Obama issued Executive Order 13,563 which provides, in part, "[t]o facilitate the periodic review of existing significant regulations, agencies shall consider how best to promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned."[108] The Order also gave agencies 120 days to submit a plan to OIRA for implementing retrospective analysis.[109]

Agencies have complied, issuing new policies to periodically review existing regulations.[110] Some of these retrospective analyses during the initial regulatory

103. *Id.* at 590.

104. *See id.* at 591 ("Greenstone's central point remains. When agencies issue rules, they have to speculate about benefits and costs. After rules are in place, they should test those speculations, and they should use what they learn when revisiting a regulation or issuing a new one.").

105. *See* Michael Greenstone, *Toward a Culture of Persistent Regulatory Experimentation and Evaluation*, *in* NEW PERSPECTIVES ON REGULATION 111 (David Moss & John Cisternino eds., 2009).

106. *Id.* at 113.

107. *See* Sunstein, *Lookback*, *supra* note 102, at 591 (discussing Greenstone's ideas in the context of the motivation for mandating retrospective analysis policies).

108. Exec. Order No. 13,563, § 6(a), 3 C.F.R. § 215 (2012).

109. *Id.* § 6(b).

110. *See* Sunstein, *Lookback*, *supra* note 102, at 593 (reporting that "[t]wenty-six such plans were issued in August 2011. They included over 580 initiatives, filling more than 800 pages"). For examples of these policies, see U.S. DEP'T OF LABOR, PLAN FOR RETROSPECTIVE ANALYSIS OF

lookback led to revisions consistent with the lookback's emphasis on burdensome regulations.[111]

But retrospective analysis did not end with the regulatory lookback. In 2012, President Obama subsequently issued Executive Order 13,610 "to institutionalize regular assessment of significant regulations."[112] It requires agencies to submit biannual reports to OIRA on the status of retrospective analyses.[113]

Retrospective analysis should significantly improve the administrative state's ability to acquire information relevant to cost-benefit analyses. All the information deficiencies discussed above—difficulty untangling causation, unknown dose-response curves, unanticipated substitution and lulling effects, and the skewed incentives of parties to a rulemaking—can be in part addressed through post-implementation studies.[114] Retrospective analysis tasks agencies to acquire information on how those predictions have performed as industry has complied with the regulation, the public has started to receive its benefits, and additional studies are conducted.[115] The mere fact that agencies have adopted policies for retrospective analysis may give regulated firms, other impacted groups, and academics an additional reason to study regulatory implementation by increasing the chance that their studies may influence future rulemaking.[116]

The main benefit of retrospective analysis, though, is how that new information might be used in the future.[117] Retrospective analysis is primarily designed for agencies to learn from developments in knowledge about the effects of regulation, but to some extent retrospective analyses will inevitably also reflect developments in technology that have affected the actual costs and benefits of implemented rules. That knowledge can be used to update existing regulations, and it will also have spillover effects on other regulations—as, for example, an agency learns about the effects of particular chemicals, particular production processes, particular safety gear or tools that may be relevant for regulation of as-yet unregulated risks or other rules in need of updating.[118] Less

EXISTING RULES (2011); U.S. ENVTL. PROT. AGENCY, IMPROVING OUR REGULATIONS: FINAL PLAN FOR PERIODIC RETROSPECTIVE REVIEWS OF EXISTING REGULATIONS (2011).

111. For examples, see Sunstein, *Lookback*, *supra* note 102, at 594–95 (listing examples of regulations prompted by the regulatory lookback).

112. Exec. Order No. 13,610 § 1, 3 C.F.R. § 258 (2012), *reprinted in* 5 U.S.C. § 601 (2012).

113. *Id.* § 4.

114. *See supra* Part II.A.1 for a discussion of information deficiencies associated with snapshot cost-benefit analysis.

115. Greenstone would have regulations implemented on a small scale first so that they could be subjected to randomized tests. Greenstone, *supra* note 105, at 118–19.

116. Greenstone proposes that the government should fund independent evaluations of observed regulatory costs and benefits. *Id.* at 119–20.

117. For some helpful suggestions on how to further institutionalize retrospective analysis, *see generally* Cary Coglianese, *Moving Forward with Regulatory Lookback*, 30 YALE J. ON REG. ONLINE 57 (2013) [hereinafter Coglianese, *Moving Forward*].

118. Adrian Vermeule argues that these spillover effects can help justify centralized regulatory overview. *See* Adrian Vermeule, *Local and Global Knowledge in the Administrative State* 23–24

obviously, retrospective analysis starts to provide some information about the credibility of predictors, whether they are agencies, regulated entities, academics, or other regulated groups.[119]

But retrospective analysis leaves uncertainty about future agency action. Agencies may start new rulemakings based on the information retrospective analysis provides, but they are not required to do so. Executive Order 13,563, the initial executive order mandating retrospective analysis, mentioned the possibility that rules might be "expanded," but did not create any mechanism to spur expansion.[120] Neither does Executive Order 13,610, which institutionalized retrospective analysis.[121] The main cost of this uncertainty is that it ensures that retrospective analysis does not significantly change the incentives of regulated firms, which can be expected to comply as cheaply as possible with existing regulations and to fight new ones. Retrospective analysis merely makes it more likely they will have to fight again in the future.

The way retrospective analysis has been structured also does not fully spell out how the results of analyses are to be used in setting regulatory priorities. Each retrospective analysis an agency conducts takes time and resources away from other agency activities. All rules do not necessarily merit the same retrospective attention, so agencies need some criteria for prioritizing them. The initial Executive Order simply provides that each agency's retrospective analysis policy should be "consistent with law and its resources and regulatory priorities."[122]

The second Executive Order provides that

> [i]n implementing and improving their retrospective review plans, and in considering retrospective review suggestions from the public, agencies shall give priority, consistent with law, to those initiatives that will produce significant quantifiable monetary savings or significant quantifiable reductions in paperwork burdens while protecting public health, welfare, safety, and our environment. To the extent practicable and permitted by law, agencies shall also give special consideration to

(Harvard Law Sch. Pub. Law & Legal Theory Working Paper Series, Paper No. 13-01, 2013), *available at* http://ssrn.com/abstract=2169939.

119. *See* Coglianese et al., *Truth for Power*, *supra* note 70, at 311 ("In repeated interaction, especially when information is the currency of exchange, building a reputation matters because a regulator needs to be able to trust the information provided by an industry source."). Greenstone emphasized the credibility incentive effect on agencies, rather than private actors. Greenstone, *supra* note 105, at 119 ("[T]he potential for replication and exposing mistakes will serve as an incentive for those performing the analyses to get it correct the first time."). *Cf.* Marc Galanter, *Why the "Haves" Come Out Ahead: Speculations on the Limits of Legal Change*, 9 LAW & SOC'Y REV. 95, 99 (1974) (suggesting that "one-shotters," those who do not participate in repeated interactions, have "no bargaining reputation to maintain").

120. Exec. Order No. 13,56325, § 6(b), 3 C.F.R. § 215 (2012).

121. *See* Exec. Order No. 13,610, § 1, 3 C.F.R. § 258 (2012). Sunstein states that retrospective analyses might justify expanding regulations, but emphasizes that expansion was not an aim of the burden-reducing regulatory lookback. *See* Sunstein, *Lookback*, *supra* note 102, at 598. Conversely, Greenstone proposes that "every regulation should detail how it may be expanded if it is shown to be effective." Greenstone, *supra* note 105, at 121.

122. Exec. Order No. 13,563, § 6(b), 3 C.F.R. § 215 (2012).

> initiatives that would reduce unjustified regulatory burdens or simplify or harmonize regulatory requirements imposed on small businesses.[123]

This statement undoubtedly reflects the one-off regulatory lookback's emphasis on reducing burdens to industry. As a forward-looking guide to agency priority setting, however, it is difficult to justify. Agencies should consider the costs of rules in prioritizing, but there is no reason to give the benefits a less than equal accounting.

Executive Order 13,610 also gives no instruction on how the administration will ensure that retrospective analysis policies align with regulatory priorities *across agencies*. The *sets* of rules that one agency administers do not necessarily merit the same retrospective attention as the sets other agencies administer. To the extent that an agency's rules would benefit from more retrospective attention, the administration should, *ceteris paribus*, allocate more resources to that agency. But the Executive Order specifies no mechanism to guide those allocations. As such, the decentralized system of setting retrospective analysis policies will make it difficult to assess whether agencies' additional expenditures of resources on retrospective analysis are a product of the relative value of potential changes to the rules being reviewed or an idiosyncratic feature of how the agency has set its retrospective analysis policy.

Of course, because retrospective analysis does not require a full, new rulemaking for each reviewed rule, the resource allocation it requires may not create substantial priority-setting problems. But to the extent that agencies actually use the benefits of their retrospective analyses to conduct new rulemakings, the priority-setting problem looms larger.

C. Cost-Benefit Analysis as a Commitment Device

Cost-benefit analysis as a commitment device would reduce uncertainty about when and how rules would be updated and would alter the incentives agencies and regulated firms face. A commitment device would make subsequent analyses automatic enough to decrease uncertainty and create the new incentives, while not being so automatic that the content of new regulations would not be cost-benefit justified when they are implemented. Just as the precedents of common law courts partially, but not completely, constrain future decisions, the numbers of initial cost-benefit analyses could set the presumptions of future analyses.

The commitment device works in three steps. First, an agency conducts an initial analysis with explicit anticipation of a future, more stringent rule and conditions under which reanalysis would be triggered. Second, a private actor credibly demonstrates that it has satisfied the conditions required to trigger the reanalysis. Third, the agency conducts a narrow reanalysis in which the earlier cost and benefit predictions serve as presumptions subject to rebuttal based on the new information. If the new rule has become justified, the agency

123. Exec. Order No. 13,610, § 3, 3 C.F.R. § 258 (2012).

promulgates it and in turn precommits to a subsequent rule to replace it, if and when an even more demanding trigger is satisfied in the future.

1. Anticipatory Analysis

Anticipatory analysis would start like conventional snapshot analysis. Agencies would acquire information about the expected harm of the risk to be regulated, the potential means to regulate those harms, and the foreseeable effects of the proposed rulemaking, both intended and unintended. They would then select a rule for which the benefits justified the costs.

Anticipatory analysis would differ from snapshot analysis in that the agency would explicitly consider and ultimately select a second, more stringent rule that could be triggered in the future.[124] Some cost-benefit analyses already resemble anticipatory analysis in that an agency does not just conduct an evaluation of one particular rule, but considers multiple alternative rules or multiple levels of stringency for a particular rule. In such a case, all anticipatory analysis would change is that one rule that might "lose" under snapshot cost-benefit analysis would be given an explicit promise of a second shot later.

The critical difference with anticipatory analysis is that the stringency of anticipated rules would be set using the DEB—the administration-wide figure for the difference in expected benefits between each promulgated rule and the anticipated rule the agency would announce simultaneously to it.

Here is how the DEB would work. Imagine a rule that would set the permissible level of emission of a pollutant at 10 units. The rule would have expected benefits of $200 million, and, because it emerged from cost-benefit analysis, costs at or below that amount. Now assume the administration had set a DEB figure of $100 million. The agency would set the anticipated rule at whatever level of emission generated expected benefits of $300 million, a difference of $100 million from the $200 million of the promulgated rule. Suppose that the agency predicted that a rule set at 5 units, based on its calculations of the risk created by different levels of exposure to the pollutant, would generate benefits of $300 million. The 5-unit rule would, by definition, not be cost-benefit justified at the time of the analysis that led to the 10-unit rule. But a private actor would be able to trigger the reanalysis that led to the rule when it could credibly demonstrate that a technological innovation had brought the expected cost of the 5-unit rule below $300 million.

If each agency sets its anticipated rules using the administration-wide DEB, how frequently an agency updates a particular rule will be partially determined by the benefits the agency should expect the updated rule to achieve. Agencies will be implicitly allocating their time and resources where expected regulatory

124. The Safe Drinking Water Act requires that regulations may only be revised in a more stringent direction, but does not require that they be revised. *See* 42 U.S.C. § 300g-1(9) (2012) ("The Administrator shall, not less often than every 6 years, review and revise, as appropriate, each national primary drinking water regulation promulgated under this subchapter. Any revision of a national primary drinking water regulation shall be promulgated in accordance with this section, except that each revision shall maintain, or provide for greater, protection of the health of persons.").

benefits warrant them. If an administration likewise allocates its resources to agencies in part based on how frequently agencies reanalyze and update their rules, the administration will similarly be implicitly setting regulatory priorities through the DEB, the metric of expected regulatory benefits. Because rules will only be updated if the more stringent version passes the cost-benefit test, the commitment device should lead to increased net regulatory benefits.

2. Triggering a Reanalysis

To trigger a new analysis, a party would need to make a credible demonstration that the conditions for the trigger had been satisfied. In many cases, this would be straightforward. An innovator could simply show that its new technology achieved the specified reduction in risk and commit to market it for a certain cost. The new rule would not necessarily require the particular technology that the party seeking to trigger the new analysis has devised. It will only require that regulated firms find some means of achieving the reduction in the relevant risk.

In addition to being partially automatic, cost-benefit analysis as a commitment device differs from retrospective analysis in that its pace is set by technological development rather than a calendar.[125] Rates of change in risk-creating and risk-mitigating technologies differ across industries, so we should expect variation in when new rules become cost-benefit justified. Some rules will not need the periodic review of retrospective analysis, and some will need more rapid revision. The trigger mechanism allows actors who have the knowledge about technological change relevant to the particular rule to set the schedule for reanalysis.

3. Conducting a Reanalysis

One advantage of the commitment device is its automaticity. Agencies would be forced to act once a credible demonstration has been made that the anticipated rule has become cost-benefit justified. But there are dangers in making the adoption of revised rules *too* automatic. Agencies need not only account for technological change; they need to respond to informational change as well. The other inputs to an initial cost-benefit analysis—assumptions about the likelihood and magnitude of harms a risk creates, the costs of compliance with the initial rule, and the unintended effects of the regulation, foreseen or not—may have changed by the time a reanalysis is triggered. For the commitment device to work properly, agencies must select a level of automaticity that suffices to create incentives for private actors, but does not bind them to making future decisions that are not cost-benefit justified.[126]

125. Calabresi quipped: "Time does not serve as a good indicator of age either in all statutes generally or in regulatory ones in particular." CALABRESI, *supra* note 32, at 62.

126. For an argument that the EPA has tightened its regulation of emissions from diesel engines and fuel by only analyzing the incremental costs and benefits of the subsequent rule and not the absolute costs and benefits, see Michael R. See, *Willful Blindness: Federal Agencies' Failure to Comply*

Sometimes new information will illuminate an increase in the cost of the regulation or a decrease in its expected benefits that will erase the cost savings of the technology that triggered the reanalysis. For example, new evidence may suggest that the dose-response curve differed from the initial prediction or that the cost of compliance with the initial regulation may have been greater than anticipated. Those cost increases might affect the anticipated rule as well.[127] It is also conceivable that changes in other relevant technologies will have made the regulation more costly. For example, a cost shock to a raw material used in production processes will have made production more expensive. The subsequent cost-benefit analysis must be sensitive to these changes.

So a new analysis will not always result in the adoption of the anticipated rule. It is possible that the existing rule might be maintained, that an even more stringent rule might be justified, or that a rule even less stringent than the initial rule should be adopted. But, on reasonable assumptions, one should expect rules to gradually become more stringent. Risk-mitigating technologies rarely become more costly over time, and even though science continually discovers more associations between industrial activities and harms to our health and the environment, the overall level of background risk is decreasing.[128] As society becomes wealthier and workers therefore demand a higher risk-premium in salaries, the administrative state should periodically revise its estimate of the value of a statistical life (VSL), which informs many cost and benefit calculations.[129] A higher VSL will also make more stringent regulation likely to pass the cost-benefit test.

Whether a new analysis results in adoption of the anticipated, more stringent rule or not, the new analysis will be more narrowly focused than the initial analysis. The agency will take the cost and benefit predictions of the initial analysis as presumptions and modify its assessment of the costs and benefits based only on newly presented information and without reconsidering any issues settled in the first analysis for which new information has not been offered. The

with the Regulatory Flexibility Act's Periodic Review Requirement—and Current Proposals to Invigorate the Act, 33 FORDHAM URB. L.J. 1199, 1206–07 (2006).

127. Sunstein points to *Chlorine Chemistry Council v. EPA*, 206 F.3d 1286 (D.C. Cir. 2000) as a case for which scientific evidence on a dose-response curve mattered. Sunstein, *Arithmetic, supra* note 67, at 2281 n.180. In *Chlorine Chemistry*, a case about chloroform in drinking water, the panel explained that "in promulgating the [Maximum Contaminant Level Goal, the EPA] retained the existing standard of zero, which was based on the previously held assumption that there was no safe threshold." 206 F.3d at 1287. But the EPA admitted that the best available evidence indicated that the dose-response curve was nonlinear, suggesting that there was a safe threshold above zero. *See id.* at 1287–89. The D.C. Circuit invalidated the zero-threshold rule as arbitrary and capricious. *Id.* at 1291.

128. *See, e.g.*, CASS R. SUNSTEIN, RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT app. B at 301 (2002) ("In the past seventy years, regulatory initiatives, technological advances, and behavioral changes have significantly reduced the average level of domestic, occupational, and environmental risks in the United States . . . .").

129. *See* CASS R. SUNSTEIN, SIMPLER: THE FUTURE OF GOVERNMENT 158 (2013) [hereinafter SUNSTEIN, SIMPLER] ("As nations become wealthier, VSL naturally increases, because people have more money to spend on reducing risks."); *see also* Dora L. Costa & Matthew E. Kahn, *Changes in the Value of Life, 1940–1980*, 29 J. RISK & UNCERTAINTY 159, 160 (2004) (providing evidence of the increase in VSL).

new analysis should economize on agency time and attention and reduce the costs of participation.

Although a wide swath of federal health, safety, and environmental regulation could be subject to the commitment device, precommitting to a large number of more stringent rules would not entail a large number of reanalyses. Many rules would remain in their original forms. Critically, if anticipated rules—and the conditions for triggering the reanalyses which would lead to those rules—are set with the DEB, the rules that would be revised frequently are ones for which there has been substantial technological progress and likely a potential for a substantial gain of regulatory benefits.

III. FIXING FAILURES IN THE MARKET FOR INNOVATION

The analysis so far has addressed how agencies can calibrate their rules over time and how the structure of the commitment device can compel agency action. Health, safety, and environmental regulation should be sensitive to the incentives acting on private actors as well.[130] Industry, just like agencies, should anticipate future regulations and should adapt its plans accordingly.

Under snapshot cost-benefit analysis, the relationship of industry to health, safety, and environmental regulation is often adversarial and one-dimensional. Economic theory predicts that firms will oppose regulation to the extent they can and will comply with regulation as minimally as they can. As one researcher explains,

> When a government adopts an environmental regulation backed by a civil penalty, regulated companies acquire an economic incentive to make the discrete environmental improvement the government demands. But this incentive . . . is neither systematic nor continuous. It is not systematic, because the demand for the environmental improvement comes from governments that usually behave in fairly unpredictable ways. It is not continuous, because once a company complies with a government regulation, little incentive exists for further improvement.[131]

The hope of the commitment device is to change that relationship by co-opting market forces to further regulatory goals.[132]

A. A Brief Regulatory Taxonomy

Rules come in different forms. Two prominent types are performance standards and design standards. A performance standard sets a maximum quantity level for a risky activity, like an emissions limit.[133] A design standard

130. For a discussion of the complex relationship between private actors and regulation, see generally Jody Freeman, *The Private Role in Public Governance*, 75 N.Y.U. L. REV. 543 (2000).

131. DRIESEN, ENVIRONMENTAL, *supra* note 81, at 103 (footnote omitted).

132. *See id.* at 183–201 (arguing that environmental regulation should deliberately plan for, and encourage, innovation in risk-reducing technology).

133. Richard L. Revesz & Allison L. Westfahl Kong, *Regulatory Change and Optimal Transition Relief*, 105 NW. U. L. REV. 1581, 1597 (2011) [hereinafter Revesz & Kong, *Optimum Transition Relief*].

mandates the adoption of a particular risk-mitigating technology.[134] Some statutes require agencies to regulate based on the "best available" technology or "best practicable" technology, which does not require agencies to mandate a technology as a design standard, but rather instructs them to use the performance of a certain existing technology to set the performance standard.[135] Although some critics of command-and-control regulation take design standards to be archetypal of the category, performance standards are much more common than design standards in statutes regulating environmental risks.[136]

The commitment device could be compatible with design standards. An agency could mandate that one technology be used and precommit to adopt a more expensive technology when it becomes cost-benefit justified. But the more natural and more practical fit for the commitment device would be a performance standard.[137] The level of stringency of promulgated and anticipated rules would be set through cost-benefit analysis rather than by reference to a particular technology. Of course, the best available existing technologies might figure prominently in a cost-benefit analysis, but it would not always be the case that requiring an entire industry to use the best available technology would be cost-benefit justified. In some instances, those technologies might guide the selection of anticipated, more stringent rules rather than the rules to be promulgated.

The commitment device also need not be limited to classic "command-and-control" regulation. Some scholars have long advocated for wider use of market-based mechanisms, such as tradable permits, taxes, and deposits.[138] The

134. *Id.*

135. *See* Wendy E. Wagner, *The Triumph of Technology-Based Standards*, 2000 U. ILL. L. REV. 83, 88–89 (2000) (internal quotation marks omitted) (explaining technology standards). Chief Judge J. Skelly Wright recognized the challenge of combining technology standards with snapshot cost-benefit analysis:

> The ironic truth is that 'technology-forcing' makes the agency's standard of proof somewhat circular. Since the agency must hazard some predictions about experimental technology, it may not be able to determine the success of new means of compliance until industry implements them. Conversely, OSHA or the courts may discover that a standard is infeasible only after industry has exerted all good faith efforts to comply. Both the agency, in issuing, and the court, in upholding, a standard under this principle obviously run the risk that an apparently feasible standard will prove technologically impossible in the future.

United Steelworkers v. Marshall, 647 F.2d 1189, 1266 (D.C. Cir. 1980) (citations omitted).

136. David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L. REV. 289, 297–98 (1998) ("Environmental statutes specifically encourage performance standards[,] a form of a standard that specifies a level of environmental performance, rather than the use of a particular technique. Performance standards encourage innovation by allowing polluters to choose how to comply. Many statutory provisions severely restrict EPA's authority to specify mandatory compliance methods.") (footnotes omitted).

137. For an analysis of the strengths and weaknesses of performance standards, including their effect on incentives for innovation, see generally Cary Coglianese, Jennifer Nash & Todd Olmstead, *Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Protection*, 55 ADMIN. L. REV. 705 (2003).

138. *See, e.g.*, Cass R. Sunstein, *Administrative Substance*, 1991 DUKE L.J. 607, 631–42 (1991) (arguing that market-based incentives can be implemented at existing institutions for reasonable costs

commitment device could be employed with each of those means. Taxes, permits, and deposits still need to be set at some quantitative level, and cost-benefit analysis can be used to gradually raise those levels over time. But, for ease of exposition, the rest of this Article uses as examples hypothetical rules involving performance standards.

B. Incentives for Existing Firms

The commitment device gives any particular firm in an industry that creates a regulated risk a competitive incentive to innovate in a less risk–creating production process or directly in risk-mitigating technology.[139] The commitment device creates this incentive by decreasing uncertainty about whether a new, more stringent rule will be promulgated in the future.[140] As one recent survey of innovations to reduce climate change summarized, "it is the credible threat of stringent regulation in the future—not policies currently in place—that is most relevant to spurring investments in research and development."[141]

The first firm to implement a less risk–creating production process or develop a new risk-mitigating technology that would satisfy the conditions to trigger a new analysis would achieve a considerable first-mover advantage over its competitors, sometimes significant enough to justify the investment in research and development.[142] If the firm's innovation led to the issuing of the anticipated, more stringent rule, the firm would be in a dominant position. Because the new rule would apply across the industry, other firms would either need to adopt the new production process or technology, or find some other way to comply with the newly raised performance standard.

If the competitor firms sought to adopt the innovating firm's risk-mitigating technology or mimic its production process, the innovating firm would gain a

to efficiently address sources of harm). *See generally* Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333 (1985) (contending that economic incentive systems are feasible, effective, and fundamental alternatives to centralized regulatory commands).

139. *See, e.g.*, DRIESEN, DYNAMICS OF LAW, *supra* note 71, at 221 ("[F]irms sometimes invent products that nobody asked for in hopes that demand will materialize. Almost nobody, however, buys environmental innovations with positive costs absent government regulation demanding them. Hence, government regulations (including taxes and trading), not individual consumers, provide the demand that might create an impetus for innovation and speculative innovation in anticipation of new demand materializing occurs rarely, if at all.").

140. The literature has long recognized that regulatory uncertainty deters investment in innovation designed to comply with regulation. *See, e.g.*, Richard B. Stewart, *Regulation, Innovation, and Administrative Law: A Conceptual Framework*, 69 CALIF. L. REV. 1256, 1294 (1981) ("Decisional delay and uncertainty may deter investments by creating a risk that a project will not receive regulatory approval and by postponing—and therefore effectively reducing—return on investment even if the project is approved.").

141. David E. Adelman & Kirsten H. Engel, *Reorienting State Climate Change Policies to Induce Technological Change*, 50 ARIZ. L. REV. 835, 854 (2008).

142. *See, e.g.*, Blais & Wagner, *supra* note 55, at 1736 (arguing that a trigger to update rules will create a first-mover advantage for firms).

new source of revenue in licensing its patented technology to competitors.[143] If the competitor firms sought instead to comply with the new standard in some other way, whatever compliance costs they faced would be comparative gains for the innovating firm, provided that the second-mover firms' compliance costs outweighed any marginal research and development costs the first-mover firm spent on the innovation.[144]

Part of the first-mover advantage comes from the innovating firm's ability to exploit its idiosyncratic advantages.[145] For example, the innovative production process might be less expensive for that firm because of its specific location or specialized human capital. But because the regulation would apply industry-wide, the other firms in the industry would incur a comparative cost for not having those idiosyncratic advantages. There is empirical evidence that "firms which could reduce lead content at relatively low costs (thanks to large refineries) tended to support the tradeable permit system by which the leaded content of gasoline was reduced in the 1980s, while firms with less efficient, smaller refineries were vehemently opposed."[146] In other words, the commitment device allows firms to cash out on the ways in which they are more able to prevent risks to health, safety, and the environment, thereby giving them an incentive to develop those advantages and trigger a new analysis.

C. Incentives for Outsiders

One critical advantage of cost-benefit analysis as a commitment device is that it sends a signal to actors other than the management of regulated firms that an agency is committed to adopting a more stringent regulation when it is cost-benefit justified. This is especially advantageous in industries in which hostility

143. For a skeptical take on the claim that the existing patent system protects first-mover advantages, see Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L. REV. 337, 395–408 (2008). *See also id.* at 340 (arguing that in a competitive market, "early experimenters will gain some first-mover advantages, as they also do with technological innovations, but late-entering competitors obtain two important second-mover advantages against early market experimenters. First, they do not have to bear the cost of investing in market development. Second, they can copy the first experimenter's market successes and avoid repeating its failures."); Marvin B. Lieberman & David B. Montgomery, *First-Mover Advantages*, 9 STRATEGIC MGMT. J. 41, 43–44 (1988); Richard L. Revesz, *Federalism and Environmental Regulation: A Public Choice Analysis*, 115 HARV. L. REV. 553, 555–59 (2001) [hereinafter Revesz, *Federalism*].

144. Alternatively, the first-mover firm may just acquire some of the less well-situated firms. *See* Michael P. Vandenbergh, *The Private Life of Public Law*, 105 COLUM. L. REV. 2029, 2091 (2005) ("[I]n an industry sector that is about to face new environmental compliance costs, a firm that has access to better technology or has a better managed environmental compliance program may acquire a firm that will incur higher compliance costs.").

145. Nathaniel O. Keohane, Richard L. Revesz & Robert N. Stavins, *The Choice of Regulatory Instruments in Environmental Policy*, 22 HARV. ENVTL. L. REV. 313, 351 (1998) ("[A] firm may support policy instruments that impose costs on it, as long as those costs affect it less than the industry average, giving it a competitive advantage.").

146. *Id.* (footnote omitted). *But see id.* at 351–52 ("Other empirical work, however, has cast doubt on the proposition that firms advocate instruments based on inter-industry or intra-industry transfers.").

towards health, safety, and environmental regulation is deeply ingrained in the business culture.[147]

1. Lower-Level Managers and Workers

One audience for this signal is individuals at firms who have industry-specific knowledge about how production processes could be improved but lack power or rank at their firm. In other words, the commitment device might help solve what economists call the gatekeeper problem, in which useful knowledge is not relayed up the hierarchy because it does not benefit the perceived interest of higher-level managers.[148]

This is particularly plausible in the case of worker health and safety regulation. Workers—perhaps especially but not exclusively if their knowledge were mediated through unions—might have a better sense of how workplaces could be made safer or more health-protective in relatively cheap ways but lack a strong incentive to participate in the current regulatory process. Sometimes lower-level managers will have innovative ideas as well, but lack the influence over, or ability to get the attention of, higher-level management.

These gatekeeper problems are a classical organizational failure: management either does not have or does not want the knowledge it needs to innovate. The benefit of the commitment device here is that anyone can satisfy the conditions to trigger a new analysis. As long as innovators credibly demonstrate to the agency that compliance with the new rule will be cost-benefit justified, the agency would be obliged to adopt the rule.

2. New Entrants to the Market

Potential innovators need not be affiliated with existing firms in the market. Innovators who have a plan to start over with a new, greener, or safer production process, not saddled by legacy technology, could use the potential for a new, more stringent regulation as their way to overcome the barriers to entry in the market.[149] This point interacts with the last point. It might be objected that lower-level managers and workers in an existing firm would never seek to trigger

147. In a series of influential articles, Dan Kahan and collaborators have argued that one's perceptions of risk and of the effectiveness of risk regulation are in part a product of "cultural cognition"—motivated reasoning that seeks to reduce the cognitive dissonance between one's empirical beliefs and one's cultural style. *See, e.g.*, Dan M. Kahan, Paul Slovic, Donald Braman & John Gastil, *Fear of Democracy: A Cultural Evaluation of Sunstein on Risk*, 119 HARV. L. REV. 1071, 1083–88, 1108 (2006) (reviewing CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE (2005)) ("A growing body of research demonstrates that conflicts in perceptions of risk . . . reflect individuals' adherence to competing visions of how society should be organized.").

148. *See generally* Timothy F. Malloy, *Regulating By Incentives: Myths, Models, and Micromarkets*, 80 TEX. L. REV. 531, 555–71 (2002) ("[T]he gatekeeper does not channel resources solely in accordance with explicit or even implicit calculations. Rather, she directs her attention and resources in accordance with principles imbedded in the firm's incentive and communication structures.").

149. Of course, existing firms can seek environmental regulations to *create* barriers to entry. *See, e.g.*, Keohane et al., *supra* note 145, at 351.

a new analysis that could lead to costs for their firm, lest they be fired. But the ability of managers and workers to quit and start a new, rival firm gives them the solution to the gatekeeper problem, at least insofar as the relevant jurisdictions disfavor noncompete agreements.

3. Opportunistic Innovators

The innovator need not even be in the risk-creating industry at all. The firm that seeks to trigger the new analysis could specialize in health, safety, or environmental protection or compliance—firms with expertise in "end-of-the-pipe" fixes, worker safety gear and tools, or green technology. For example:

> The impetus for regulation sometimes comes from manufacturers of pollution control equipment, environmentally friendly technologies, or inputs to production processes favored by the regulatory regime. For example, firms specializing in the cleanup of hazardous waste sites emerged in response to the federal Superfund statute. The hazardous-waste cleanup industry has become a powerful advocate of stringent Superfund cleanup standards. Similarly, the ethanol industry has strongly supported stricter regulation of gasoline. As a result of its efforts, the Clean Air Act's clean fuels program provides strong incentives for the use of ethanol, and the federal government has provided large subsidies to ethanol producers.[150]

These firms aim not to produce the risk-creating product, but just to opportunistically force risk-creating firms to purchase their risk-mitigating technology or pay a license fee. These examples notwithstanding, the uncertainty surrounding future health, safety, and environmental regulation impoverishes the market for risk-mitigating technology, especially when management at existing firms across an industry has no interest in these types of innovations. The commitment device might stimulate the market and unlock venture capital.

4. Pro-Regulatory Groups or Individuals

Finally, there is no reason why the incentive effect of the commitment device should be limited to industry. All the passion that goes into organizing, litigating, and lobbying for health, safety, and environmental regulation would have an additional outlet. Instead of spending more time arguing over rulemakings, pro-regulatory groups could seek out potential innovators and fund them. In other words, if the financial incentives the commitment device created for new market entrants or opportunistic innovators were insufficient, pro-regulatory groups could provide an additional subsidy.[151] Investing in health, safety, and environmental innovation would sometimes be a more valuable use of donor funds than electing regulation-friendly candidates or supporting regulation-friendly lobbyists and lawyers.

150. Revesz, *Federalism*, *supra* note 143, at 574 (footnotes omitted).

151. *See id.* at 577 (stating that "the literature contains examples of 'Baptist-bootlegger' coalitions, in which the environmental groups, the 'Baptists,' have cooperated with polluters, the 'bootleggers,' to obtain environmental regulation through the political process" and providing an example).

D. Incentives to Anticipate Regulation

The partially automatic nature of the commitment device also creates the potential that firms might voluntarily comply with the more stringent anticipated rule before the new rule comes into effect.[152] Some law and economics researchers predict that "changes in government policy—or, more generally, changes in the prospects for reforms—will affect the value of investments made prior to those changes to the extent that such changes were not fully anticipated."[153] Therefore, if the chance of successfully fighting or even significantly delaying the regulation is low, it might be less costly for regulated firms to just comply voluntarily and not waste the time and money.

Suppose that, at the moment that a reanalysis is triggered, firms anticipate that the technological innovation used to trigger the new analysis far exceeds the DEB-required benefits difference and is marketed far below the cost that would justify those benefits. In that instance, the other inputs to the rulemaking process—new information about the relevant costs and benefits—are unlikely to undercut the cost-benefit justification of the required rule. The even greater certainty of more stringent regulation might make the cost to the firm of voluntarily complying with the anticipated rule lower than its expected cost of fighting to delay the rule and postpone compliance. This point is especially strong if the rule is in the form of a performance standard, so a firm can comply using whatever means is least expensive for that firm.[154]

In the current system, problems of agency inaction and rulemaking ossification inhibit firms from anticipating regulation.[155] The way to spur anticipation is to reduce the uncertainty about future regulation, and the commitment device's partial automaticity achieves the reduction.

IV. DEOSSIFYING THE RULEMAKING PROCESS

Implementing cost-benefit analysis as a commitment device would require that agencies conduct more rulemakings on preexisting rules. But the commitment device would combat rulemaking ossification[156]—or at least aim to avoid exacerbating it—by changing how the politics of the rulemaking process works in four ways. First, because of the new economic incentives the commitment device would create for firms that stood to gain from more stringent

152. Louis Kaplow wrote the seminal article in this literature. *See* Louis Kaplow, *An Economic Analysis of Legal Transitions*, 99 HARV. L. REV. 509 (1986). For the leading criticism, see Steven Shavell, *On Optimal Legal Change, Past Behavior, and Grandfathering*, 37 J. LEGAL STUD. 37 (2008).

153. Kaplow, *supra* note 152, at 518.

154. *See* Revesz & Kong, *Optimum Transition, supra* note 133, at 1595 (explaining that, for example, "if regulations require the installation of smoke scrubbers that reduce emissions by a certain percentage, a firm that anticipates stricter regulations in the future might rationally choose to spend more money now for more efficient scrubbers that would reduce emissions by a higher-than-required percentage, thus saving the higher costs of retrofitting its plant in the future").

155. *See id.* at 1604–09 (explaining how regulatory delay deters anticipation).

156. *See generally* McGarity, *supra* note 49 (describing the existence and causes of rulemaking ossification and discussing possible solutions to deossify the rulemaking process).

rules, it would sometimes break the coalition of firms opposed to more stringent regulation. Second, it would dampen the ideological passions of rulemaking by shifting the focus of the analysis to factual predictions. Third, the iterative nature of reanalysis would provide a record of the accuracy of the predictions of parties to the rulemaking, and in the long run, reward credibility. Fourth and finally, the commitment device would lower the stakes of each particular rulemaking—if a party thinks the agency genuinely erred in its cost and benefit calculations, it could patiently wait to be vindicated or subsidize market efforts to expedite the day of its vindication.

A. Dividing the Interests of Regulated Firms

Many health, safety, and environmental rulemakings feature united, mobilized, and generally well-funded industry lawyers and lobbyists against pro-regulatory consumer, worker, or environmental nonprofit groups. There are some exceptions: insurance firms, for example, sometimes have pro-regulatory interests. But for the most part, industry has every incentive to exaggerate the costs and minimize the benefits of regulation, and pro-regulatory groups have arguably equally strong incentives in the other direction. Regulated firms may have an asymmetric advantage because they have the resources to flood regulatory agencies with information.[157]

The commitment device would, in some cases, break the coalition of regulated firms.[158] Firms that stood to gain from agencies adopting anticipated rules would have a financial incentive to defect from united anti-regulatory efforts and even to support regulation. Defections are rare, but not unheard of. For example:

> [I]n the 1970s, aerosol product firms tried to maintain a unified opposition to a ban on chlorofluorocarbon (CFC) propellants. As consumer resistance to aerosol products emerged, however, the S.C. Johnson Wax Company broke ranks and publicly announced that it would remove all CFC propellants from its products, thus revealing to government decision makers that a ban would be feasible. S.C. Johnson could take this position because it had developed water-based propellants twenty years earlier and used CFCs in only a small fraction of its aerosol products.[159]

The commitment device makes this type of defection more likely by reducing uncertainty that taking the pro-regulatory stance will lead to new regulation. Moreover, as the CFC example illustrates, risk-creating firms seeking to benefit from the first-mover advantage of new regulation would offer a

157. *See generally* Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321 (2010) (exploring the problem of information capture in contemporary administrative governance).

158. *See* Blais & Wagner, *supra* note 55, at 1733–34.

159. Coglianese et al., *Truth for Power*, *supra* note 70, at 297 (citing LYDIA DOTTO & HAROLD SCHIFF, THE OZONE WAR 164, 166 (1978)).

powerful source of information to agencies.[160] They have largely the same information about the effects of regulation as their competitors, but would have an incentive to provide competing estimates of the likely costs of regulation.[161]

Similar incentives exist for the other parties who might benefit from new regulation compelling adoption of their technologies: new entrants into the risk-creating market, lower-level managers or worker groups at firms, and opportunistic firms specializing in risk-mitigating technologies. These groups could helpfully ally with pro-regulatory groups, providing the industry-specific information that activists might not otherwise have. In some cases, the politics of certain rulemakings would not be industry versus outsiders, but anti-regulation firms in the industry versus pro-regulation firms and their pro-regulation, nonprofit allies.

Industry could try to punish firms that defected from their anti-regulatory coalition.[162] They could invoke a Pandora's box argument: the reanalysis the pro-regulation firm sought to trigger might lead to an even more stringent rule than anticipated, stringent enough that even the pro-regulation firm would oppose it. But the pro-regulation firm might have the greatest ability to predict how the new cost-benefit analysis would play out—after all, its technology would be driving the updating—and could therefore independently assess the plausibility of the Pandora's box argument.

The effect of dividing the interests of regulated firms might prove useful even in the extreme case in which agencies are actually captured by industry. To the extent that some firms would no longer share the regulatory goals of their competitors and their competitors' captured agency, they would have the incentive to draw attention to the capture, and lobby and litigate against it.

B. Shifting the Focus to Facts

One of the arguments that advocates of cost-benefit analysis have offered on its behalf is that it focuses regulatory discourse on questions of fact, thereby calming the ideological emotions of regulation.[163] This is not to say that cost-benefit analysis involves no questions of value. Assigning value to certain costs

160. *See id.* at 291 ("When no firm's benefits from revealing information outweigh its benefits from silence, there is no conflict between individual and collective interests; silence will prevail. But when firms' individual interests to reveal conflict with the industry's collective interest in silence, maintaining silence effectively becomes a problem of collective action."). For a more general account of the interaction between institutional design and information incentives, see generally Matthew C. Stephenson, *Information Acquisition and Institutional Design*, 124 HARV. L. REV. 1422 (2011).

161. *See* Coglianese et al., *Truth for Power*, *supra* note 70, at 292 ("[I]f competitors differ in the costs of controlling a certain type of risk, it may be beneficial for a low-cost firm to disclose information about the risk to the regulator.").

162. Coglianese and his coauthors do not make this point explicitly, but it should follow from their description of the information incentives of firms with differential costs as a "collective action problem." *See id.* at 291.

163. *See, e.g.*, Sunstein, *Lookback*, *supra* note 102, at 580 ("Amidst political polarization, it is often helpful to focus on facts—on what, exactly, is known or at least knowable. Careful assessment of facts, and projection of likely consequences, can have a cooling function." (emphasis omitted).

and benefits presents difficult moral choices.[164] But much of administrative rulemaking under cost-benefit analysis involves mundane factual questions.

The commitment device sharpens this focus by promising that factual questions will eventually be answered when agencies evaluate the factual predictions of initial analyses during subsequent reanalyses. The increased likelihood that a reanalysis would lead to new regulation, and the increased confidence firms would have about the specific contours of the new rule, would increase the incentive to acquire information about the effects of regulation. Because reanalyses would be limited in scope to the question of whether new information had justified the anticipated rule, they might be less ideologically charged than initial rulemakings.

C. Creating Incentives for Credibility in a Repeated Game

Under snapshot cost-benefit analysis, talk is cheap.[165] Participants in rulemakings suffer little cost for making the erroneous factual predictions. The commitment device turns cost-benefit analysis into a repeated game.[166] When reanalyses are conducted, agencies can assess the accuracy of earlier predictions. No actor will have perfect knowledge about the future, but over time firms, nonprofit advocacy groups, and academics will develop a track record of predictions. Agencies can rely on those track records in making future assessments, thereby creating an ex ante incentive for credible predictions even in initial analyses.[167]

D. Lowering the Stakes of Each Decision

Snapshot cost-benefit analysis can have an all-or-nothing quality. When regulated firms and pro-regulation groups know that a rule is likely to linger unchanged—or never exist at all—depending on the outcome of the initial

164. *See, e.g.*, KYSAR, *supra* note 29, at 123–99. *See generally* ACKERMAN & HEINZERLING, *supra* note 29 (criticizing the role of economic analysis and theory in health and environmental policy and advocating for a more holistic approach that restores a sense of moral urgency to the cost-benefit analysis).

165. *See* Coglianese et al., *Truth for Power*, *supra* note 70, at 290 ("The provision of information to support effective public decision making benefits society on net. Yet potential targets of regulation will often lose, and therefore will have the incentive to yield or withhold information strategically. Targets' decisions to produce information, and to reveal, bias, or conceal what they hold, will reflect their calculated attempts to influence the knowledge and perceptions of regulators so as to promote public decisions that either reduce their anticipated costs or increase their private benefits.") (footnotes omitted).

166. *See id.* at 311 ("By providing information adverse to its interests, at least once in a while, a firm can bolster its credibility as an industry source, making it more likely that the government will grant the firm some implicit discretionary benefit—if only by believing the firm other times when information it shares seems self-serving. Such credibility could prove especially valuable when providing information about industry costs or technological feasibility.").

167. *See id.* at 334 ("A firm may wish to distort information given to the regulator in any given round of the regulatory game, but if the regulator uncovers a deception it can retaliate against the firm in later rounds (albeit perhaps in subtle ways).").

analysis, each rulemaking has dramatic stakes.[168] The commitment device lowers the stakes considerably. If the side that did not prevail confidently believes that its factual predictions were correct, time will test that belief, and it may well be vindicated on reanalysis. Pro-regulatory groups might also realize that their best option after an agency adopts a rule that they find too lenient is to subsidize technological innovation in the marketplace. It is plausible that, by lowering the stakes of each individual rulemaking, the commitment device might deter disgruntled parties from seeking judicial review because it might prove less costly to seek redress through reanalysis rather than from the courts.[169]

Taken together, these changes could make rulemakings under a commitment device regime less contentious and more productive, even in the absence of reforms to the APA's procedural mandates or hard look judicial review.

V. SETTING AGENCY AND ADMINISTRATION PRIORITIES

Because agencies have finite time and resources, they must set priorities across rules. Administrations face parallel constraints, so they must prioritize across agencies. These priority-setting problems are related, but not identical to, the more general problem of priority setting in risk regulation—which risks should be regulated and what burdens should be imposed to achieve the reduction in risk.

Regulatory reformers have repeatedly criticized the administrative state for setting priorities badly or neglecting to set priorities at all.[170] Cost-benefit analysis has been defended as a means to set better regulatory priorities generally.[171] Using cost-benefit analysis as a commitment device is consistent with the view that cost-benefit analysis should generally guide regulatory priority

168. *See, e.g.*, McGarity, *supra* note 49, at 1436 ("Given all of the barriers to writing a rule in the first place, few agencies are anxious to revisit the process in light of changed conditions or new information. Knowing that mistakes or miscalculations in rules will be very difficult to remedy, agencies are also reluctant to write innovative or flexible rules in the first instance.").

169. *See id.* at 1426 ("As long as the relevant agency decisionmakers believe that they must expend additional resources in anticipation of overly intrusive judicial review, they will be reluctant to undertake new rulemaking initiatives, to experiment with more flexible regulatory techniques, and to revisit old rulemaking efforts.").

170. *See, e.g.*, STEPHEN BREYER, BREAKING THE VICIOUS CIRCLE: TOWARD EFFECTIVE RISK REGULATION 19–21 (1993) (describing what the author calls the administrative state's "random agenda selection" in the regulation of health risks); SUNSTEIN, COST-BENEFIT STATE, *supra* note 66, at 4 ("[A] closer look at federal regulatory policy shows a wide range of problems. Perhaps foremost is exceptionally poor priority setting, with substantial resources sometimes going to small problems and with little attention to some serious problems.").

171. *See, e.g.*, SUNSTEIN, COST-BENEFIT STATE, *supra* note 66, at 139–40 (defending cost-benefit analysis as "an approach that attempts to assess the magnitude of problems and to ensure sensible priority setting."). Breyer proposes a "centralized administrative group"—potentially "an augmented OIRA"—to set priorities. *See* BREYER, *supra* note 170, at 74–77. His description of how that group would set priorities sounds remarkably like cost-benefit analysis. *See, e.g.*, *id.* at 77 ("[T]he group, after noticing that a little extra money spent on, say, vitamin supplements for pregnant women, or fireproofing space heaters would buy much more health safety than extra money spent on avoiding low-level radiation risks, would then ask what we should do about it.").

setting. What the commitment device adds is a means for agencies and administrations to decide how to allocate time and resources to updating existing regulations.

The commitment device would set agency and administration priorities through the DEB.[172] It would change existing practice in three ways. First, it would require greater uniformity in cost-benefit analysis across agencies—setting a consistent DEB for reanalyses across agencies requires a minimum consistency in the other numbers agencies use in assessing costs and benefits. Second, it would curtail discretion both at the agency and administration level; private actors would be compelling reanalyses, and agencies would not be able to defer them. Third, and most importantly, it would prioritize the reanalysis of already existing rules over potential rules and thus prioritize already regulated risks over as-yet unregulated risks. This Section defends each of those changes to priority setting.

A. The Case for More Standardized Analyses

For the implicit priority-setting effects of administration-wide DEB figure to work, the *other* assumptions used in cost-benefit analyses must be roughly similar across agencies. OIRA already achieves considerable standardization in cost-benefit analyses. OIRA's parent, the Office of Management and Budget (OMB), publishes Circular A-4, which "is designed to assist analysts in the regulatory agencies by defining good regulatory analysis . . . and standardizing the way benefits and costs of Federal regulatory actions are measured and reported."[173] In practice, Circular A-4 greatly influences how cost-benefit analysis is conducted.[174]

The commitment device would require standardization beyond what Circular A-4 prescribes.[175] For example, Circular A-4 does not mandate an administration-wide figure for the VSL.[176] The VSL dramatically affects calculations about the expected benefits of rules, so any priority-setting system keyed to expected benefits will be sensitive to differences in the VSL. To be clear, the issue here is not whether VSL should be disaggregated for different types of death,[177] or whether a figure for statistical life-years should be used

172. See *supra* Part II.C.1 for a description of how the DEB would operate.

173. OFFICE OF MGMT. & BUDGET, CIRCULAR A-4, REGULATORY ANALYSIS 1 (2003), *available at* http:// www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf.

174. For examples of how agencies use Circular A-4, see generally Cass R. Sunstein, *The Real World of Cost-Benefit Analysis: Thirty-Six Questions (and Almost as Many Answers)*, 114 COLUM. L. REV. 167 (2014).

175. Coglianese argues that "[i]f the Obama Administration is serious about deepening and strengthening regulatory review, at the very least it should create retrospective evaluation guidelines comparable to Circular A-4." Coglianese, *Moving Forward*, *supra* note 117, at 62.

176. OFFICE OF MGMT. & BUDGET, *supra* note 173, at 29–31.

177. *See generally* Cass R. Sunstein, *Valuing Life: A Plea for Disaggregation*, 54 DUKE L.J. 385 (2004) (explaining why agencies should incorporate risks for certain types of death into the VSL).

rather than a figure for statistical lives.[178] The issue is whether the VSL should vary simply because a risk is regulated by a different *agency*.[179] If agencies assign wildly varying values to statistical lives, then how frequently they reanalyze existing rules—and, indirectly, how agency and administration resources would be allocated—might be determined by agencies' idiosyncratic choices, rather than by the expected benefits of the new rules.

The intuitive case for a standardized VSL is strong, even ignoring its priority-setting effects. Consider an industry that could use either of two production processes to manufacture a product, each of which creates a different health risk. Now imagine that these health risks are regulated by separate agencies, and that one of the agencies arbitrarily uses a substantially higher figure for the VSL in its cost-benefit analyses. Even though a direct comparison between the two health risks might show that there is a greater loss of lives at the same cost of compliance to using one of the production processes, the combined effect of the two rules might be for industry to substitute the more harmful production process for the less harmful one because the more harmful one was less stringently regulated due to the difference in VSL. This would be a rationally indefensible regulatory outcome, yet it is possible if agencies can set their own VSL figures.

Agency figures for the VSL used to vary wildly.[180] They now are usually between $7 and 9 million,[181] in part due to pressure from OIRA to standardize.[182] The commitment device would require further standardization. Other important assumptions in cost-benefit analysis, such as the discount rate for future generations, would also need to be consistent across agencies. The most important standard figure would be the DEB itself, because it would set the conditions for updating rules.

178. *See generally* Cass R. Sunstein, *Lives, Life-Years, and Willingness to Pay*, 104 COLUM. L. REV. 205 (2004) (advocating for an alternative measurement—the value of a statistical life-year—that would lower benefits for the elderly while increasing benefits for children).

179. Of course, this assumes the VSL is standardized across rules *within* agencies. But agencies already have a strong reason to do this. Matthew Adler and Eric Posner have explained that,

> [i]f an agency assumes a high valuation of life when justifying a regulation that injures one industry, while assuming a low valuation of life when rejecting a regulation that injures another industry, and the regulations are in other respects identical, suspicions will be aroused that the second industry has captured the agency.

Matthew D. Adler & Eric A. Posner, *Implementing Cost-Benefit Analysis When Preferences Are Distorted*, 29 J. LEGAL STUD. 1105, 1141–42 (2000); *see also id.* at 1142 n.66 (speculating that this kind of suspicion might explain the Fifth Circuit's reasoning in *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201,1222–23 (5th Cir. 1991), "which criticized the EPA for defending a regulation on the basis of a valuation for lives saved that is higher than that used to reject other regulations").

180. *See* Eric A. Posner & Cass R. Sunstein, *Dollars and Death*, 72 U. CHI. L. REV. 537, 549 (2005) ("For a period, agency figures were highly and inexplicably variable.").

181. SUNSTEIN, SIMPLER, *supra* note 129, at 159.

182. *See id.* at 158–59 ("We also worked hard to ensure that the actual practice of government agencies is well within the range of the technical literature, and that they avoid large or puzzling inconsistencies.").

The argument for an administration-wide DEB mirrors the argument for an administration-wide VSL, albeit in a weaker form. Consider again the hypothetical about a product that could be manufactured using either of two different production processes, which happened to be regulated by different agencies. But now imagine that, instead of the two agencies differing in the figure they use for the VSL, they differ in the DEB they use for setting anticipated rules for reanalysis. The agency that uses a larger DEB to set the difference in expected benefits between its promulgated rules and anticipated rules would likely update its rules less frequently. As a result, its rules might remain more lenient for a longer period of time. As in the VSL example above, it is conceivable that firms might substitute in favor of the riskier production process, not because it was cheaper, but simply because the less risky process was regulated with a more frequently updated—and therefore more stringent—rule.

The general principle underlying these arguments is that any difference in how agencies conduct cost-benefit analysis can skew the relative stringency of their rules, and how frequently agencies update their rules can have a parallel effect. The commitment device solves this problem by mandating that cost-benefit analysis dictates when rules are updated and that agencies use the same DEB in setting their anticipated rules.

B. The Case for More Automatic Priority Setting

The commitment device does not just require priorities to be set using similar assumptions. It sets priorities automatically. A private actor could trigger a reanalysis with a credible demonstration that an anticipated rule had become cost-benefit justified, and the agency would be required to conduct the reanalysis regardless of whether or not the agency leadership believed it was a good use of agency resources. The argument for setting regulatory priorities automatically through the indirect effects of cost-benefit analysis mirrors the argument for calibrating the content of rules through cost-benefit analysis. It is better than the plausible alternatives—namely, no priority setting, capture-influenced priority setting, and direct cost-benefit analysis priority setting.

First, at a minimum, the commitment device's priority-setting regime improves on priority setting, what Stephen Breyer once called "random agenda selection."[183] "Agency priorities and agendas," he explained, "may more closely reflect public rankings, politics, history, or even chance than the kind of priority list that environmental experts would deliberately create."[184] Agencies have structural pressures to neglect setting priorities. Priority setting consumes time and resources, so it might be subordinated to first-order rulemaking, enforcement, and adjudication. Nonautomatic priority setting requires effective managerial control, so principal-agent problems alone could result in random priorities. Finally, even if agencies rationally prioritize new rulemakings, the asymmetric incentives of judicial review that bias agencies towards inaction might cause them to ignore updating rules.

183. BREYER, *supra* note 170, at 19.

184. *Id.* at 20.

Second, to the extent that agencies devote time and resources to setting priorities, regulated firms may influence how discretionary priorities would be set. Agencies may be consumed by "information capture: embedded participatory imbalances that emerge from the administrative legal system's infinite tolerance of and even tendency to encourage information excess. . . . [which] allows strategic parties to effect considerable control over the agency's priorities and the substance of regulatory decisionmaking."[185] One argument for using cost-benefit analysis to calibrate rules is that it diminishes the influence of regulated firms in the rulemaking process or at least makes that influence more transparent.[186] Likewise, one argument for using cost-benefit analysis to set priorities automatically is that it removes the influence of regulated firms in priority setting altogether. The commitment device gives agencies political cover. Regulators would be able to point to the commitment device to explain to regulated firms why they prioritized whatever rule a particular firm opposed.

Third, allowing the commitment device to set priorities indirectly through the DEB is superior to directly setting priorities through cost-benefit analysis. The information cost of a policy of requiring a cost-benefit analysis for each agency priority-setting decision would be staggering. It would require agencies to simultaneously monitor the pace of technological change across different rules and different industries and might swamp the benefits of better prioritization.

The commitment device affects administration priority setting in a different way than it affects agency priority setting. Agencies would be compelled to allocate more time and resources to reanalyzing existing rules. The effect on administration priorities is more indirect. Some agencies would submit more updated rules to OIRA, and some agencies would be able to make a better case to the central administration or to Congress for a larger budget and staff. But whether the administration actually acted on those submissions and requests would still be partially discretionary.

Administrations *should* honor those shifts in priorities. To do otherwise would leave some agencies overburdened with demands for reanalyses and ultimately might undermine the smooth functioning of the commitment device. But OIRA should continue to exercise its traditional function of scrutinizing how agencies conduct cost-benefit analyses to ensure that the assumptions agencies use in going from the DEB to anticipated rules are not gaming the system to attract more resources.[187]

185. Wagner, *supra* note 157, at 1431.

186. *See, e.g.*, ADLER & POSNER, *supra* note 84, at 117 ("[B]y enhancing transparency, [cost-benefit analysis] should reduce the influence of interest groups on regulatory outcomes. Interest groups do not seek welfare-maximizing regulations, they seek regulations that maximize their own profits. Thus, the goals of interest groups conflict with the results of [cost-benefit analysis].").

187. *See* Livermore & Revesz, *Regulatory Review*, *supra* note 24, at 1361–62 ("OIRA review . . . provid[es] some check against the possibility that particular considerations would be left out of an agency's decision-making process as a result of capture.").

C. *The Case for More Attention to Already Regulated Risks*

The commitment device would not just change how agencies and administrations set priorities. It would also change the substance of those priorities by compelling agencies to spend more time and resources reanalyzing existing rules. Some experts worry that regulatory agencies *already* consume too much time and too many resources with existing rules,[188] yet the commitment device would prioritize already regulated risks at the expense of as-yet unregulated risks.

The shift in priorities raises a problem similar to the so-called "last 10 percent problem."[189] The problem occurs when

> [t]he regulating agency considers a substance that poses serious risks, at least through long exposure to high doses. It then promulgates standards so stringent—insisting, for example, upon rigidly strict site cleanup requirements—that the regulatory action ultimately imposes high costs without achieving significant additional safety benefits. . . . Removing that last little bit can involve limited technological choice, high cost, devotion of considerable agency resources, large legal fees, and endless argument.[190]

The simple answer to the last 10 percent problem is for agencies to use cost-benefit analysis. When more stringent regulation ceases to produce significant benefits, proposed rules should fail a cost-benefit test. But for the commitment device, that answer is too simplistic. It could be the case that agencies update rules in cost-benefit justified ways, but, by neglecting to regulate new sources of risk, miss out on the potential to achieve greater regulatory benefits.

One response is that the shift in priorities towards updating new rules might not be as dramatic as it initially appears. The recent adoption of policies for retrospective analysis has already moved the administrative state in the direction of reviewing existing regulations rather than regulating new risks.[191] The commitment device takes this process further. Updating rules through new rulemakings would undoubtedly consume more agency time and resources than retrospective analysis, but for retrospective analysis to be a meaningful mechanism for improving existing regulation—rather than just a mechanism for agency learning—agencies will ultimately need to act on retrospective analyses by updating existing rules. The commitment device is simply one way to systematize updating rules, so the real comparator is whatever system agencies intend to use to implement the knowledge they gain from retrospective analysis.

Recall as well the arguments from Section IV about how the commitment device would streamline rulemaking. Reanalyses would be limited to processing new information, guided by the presumptions that initial rulemakings set. Initial rulemakings would involve the new element of anticipatory rulemaking, but they

188. *See generally* Sidney A. Shapiro, *Agency Priority Setting and the Review of Existing Agency Rules*, 48 ADMIN. L. REV. 370 (1996).

189. *See* BREYER, *supra* note 170, at 11.

190. *Id.* (footnotes omitted).

191. See *supra* Part II.B for an overview of retrospective analysis.

would also have lower stakes because of the possibility of updating. To the extent that the option of updating rules reduced the incentive for frustrated parties to seek judicial challenges, it might economize on agency resources.

There also would be diminishing marginal returns to later iterations of reanalyses. Rules can only be tightened so much before prohibiting an even lower level of the source of risk will cease to be cost-benefit justified. Keeping a consistent DEB between promulgated and anticipated rules, in combination with the requirement that every rule be cost-benefit justified, should prevent agencies from trapping themselves in cycles of marginally useless rulemaking.

Thus, the reallocation of resources away from unregulated risks might not be as costly as it initially appears. It is plausible that it might even be desirable. To the extent that agencies and even administrations are shying away from updating existing rules because of the disproportionate influence of entrenched regulated firms, the commitment device may aid legitimate regulatory goals that would otherwise be thwarted.

The most interesting defense of the shift in priorities is more speculative: the regulatory state has already gone after the big killers. In other words, there is some correlation between the magnitude of threat that health, safety, and environmental risks pose—and, more tenuously, our ability to combat those risks in a cost-benefit justified way through regulation—and the likelihood that Congress will legislate or agencies will regulate. Myriad sources of risk cause cancer, but few are as staggering as tobacco, asbestos, and lead. Therefore, these risks were more easily observable, and early, less sophisticated epidemiological studies could clearly isolate their effects. Of course, the magnitude of the risk and its susceptibility to mitigation through cost-benefit justified regulation are far from the only factors that cause legislation and regulation. Our intuitive toxicology and the power of industry surely contribute as well. As the Introduction explained, public health experts understood the health risks of lead long before public opinion, and ultimately legislation and regulation, caught up.

More importantly, even if the regulatory state has attacked the most potent sources of health, safety, and environmental risks first, the relevant question for assessing the priority shift is whether *further*, more stringent regulation of those risks is a better use of resources than regulating new sources of risk. It could easily be the case that the risks targeted first for regulation were the most lethal or the most well suited to cost-benefit justified regulation, but that we have now hit the point of diminishing marginal returns for further mitigating those risks.

This issue cannot be resolved a priori. The chief advantage of the commitment device is that we do not need to resolve it from the armchair. For an agency to be compelled to conduct a reanalysis, the party seeking the analysis must credibly demonstrate that the rule to which the agency has precommitted has become cost-benefit justified, and those conditions would be based on the administration-wide DEB. The administration will know what dollar amount of benefits it should expect from each reanalysis. It will also be able to learn from agencies what dollar amount of *net* benefits agencies actually expect to achieve after they conduct each reanalysis, and the net benefits could be compared to the net benefits that would have been achieved if the old rule had remained

unchanged. The administration could then compare the increase in net benefits from the reanalysis to the net benefits achieved by regulating new sources of risk. If the former were lower, the administration could adjust the DEB upwards accordingly.[192]

So even though the DEB would set priorities automatically, the DEB itself would not be set automatically. The complexity of agency and administration priority setting could be helpfully cabined to the question of where to set the DEB. Setting the DEB at the right level would not be the only priority-setting decision agencies and administrations faced, but getting it right would tackle many of the thorniest priority-setting problems at once.

VI. STARTING A BETTER DEBATE ABOUT COST-BENEFIT ANALYSIS

Cost-benefit analysis carries ideological baggage. Some proponents of more aggressive health, safety, and environmental regulation have come to see cost-benefit analysis as no more than a tool that industry and industry-friendly administrations use disingenuously to prevent, or at least delay, regulation.[193] The various anti-regulatory assumptions that have gradually been built into how agencies conduct cost-benefit analysis reinforce the beliefs of many of its critics.[194]

192. This last argument might suggest an interesting objection. Why not just have agencies set new rules using a figure for the difference in expected net benefits (DNB), rather than a figure for the DEB? The main problem with this alternative is that agencies would not be able to set a one-level trigger for reanalysis, as they can with the DEB. Instead, they would have to estimate a curve.

Here is a hypothetical. Assume the costs of a rule at exposure level X are $100 million and benefits are $200 million, for net benefits of $100 million. If the administration uses a DEB of $300 million, the agency will set the stringency of the anticipated rule at level Y, the exposure level that the agency predicts would produce $500 million in benefits. A reanalysis would be triggered when a private actor credibly demonstrated that the costs of the rule at level Y had fallen below $500 million.

The administration could instead set a DNB of $100 million. In that case, the agency would not be able set a rule at level Y. Rather, it would set a curve predicting the expected benefits at various levels of exposure. A reanalysis would be triggered when a private actor credibly demonstrated that its technology would result in costs at least $200 million (initial rule's net benefits plus the DNB) below the predicted benefits for a particular point on the curve.

The advantage of the DNB is that rule updates would always increase net benefits by a significant amount—in theory. The disadvantage is that it would require agencies to predict not just about one particular, future level of stringency, but to estimate a curve. Given how unreliable initial cost and benefit predictions are, it is unlikely the net benefits of using a DNB would be greater than those of using the DEB.

193. *See, e.g.*, ACKERMAN & HEINZERLING, *supra* note 29, at 35 ("[C]ost-benefit analysis has become a powerful weapon in the hands of vocal opponents of regulation."); DRIESEN, ENVIRONMENTAL, *supra* note 81, at 31 ("The analytical effort that CBA demands in practice greatly slows the pace of regulation.").

194. *See* REVESZ & LIVERMORE, RETAKING RATIONALITY, *supra* note 30, at 192 ("Because proregulatory interests have not engaged in the debate about how to conduct cost-benefit analysis, their pessimism towards the technique has largely become self-fulfilling. . . . [T]he antiregulatory bias within cost-benefit analysis . . . became more deeply entrenched.").

This Article has focused on the most underappreciated anti-regulatory aspect of cost-benefit analysis: its snapshot character.[195] As currently practiced, snapshot cost-benefit analysis can sometimes suggest that a potential regulation should be stricter than an agency initially proposed and lead the agency to ultimately promulgate the stricter version. But it cannot compel agencies to begin a rulemaking. The commitment device would correct the anti-regulatory procedural bias inherent in snapshot cost-benefit analysis both by compelling reanalyses of rules when they can be tightened in cost-benefit justified ways and by creating incentives to innovate in risk-mitigating technology. It might also change the politics that dominate current rulemaking debates by giving some firms an incentive to support regulation. But the commitment device would not address all the criticisms leveled against cost-benefit analysis. In particular, it might appear to strengthen the force of the criticism that cost-benefit analysis relies too much on the quantification of values that are inherently unquantifiable. The first half of this Section responds to that objection.

The second half of this Section considers a set of ideas sometimes offered as an alternative to cost-benefit analysis, the "Precautionary Principle." Proponents of cost-benefit analysis have criticized the conceptual incoherence of the Precautionary Principle at length. But the Precautionary Principle nevertheless retains powerful intuitive appeal. It needs a replacement. I propose the Vigilance Principle: the idea that regulation is a project to gradually reduce health, safety, and environmental risks over time, a project that requires persistent vigilance as scientific knowledge grows and technology develops. Using cost-benefit analysis as a commitment device would reorient the administrative state in that direction.

A. The Limits of Quantification

A series of distinct objections to cost-benefit analysis clusters around the charge that it relies on quantifying values that cannot be quantified in relevant ways. The most extreme form of this objection is the claim that the act of assigning a value to regulatory effects on human life, well-being, or the environment is in itself objectifying, dehumanizing, or in some other way intrinsically wrong.[196] The exact nature of this criticism is hard to tack down. At least some versions of it rest on a misunderstanding that the VSL is meant to signify the worth of a human life. It is, however, only a means to approximate how much one would pay to avoid a statistical risk of death or some other impairment.[197]

195. See *supra* Part II.A.1 for an overview of snapshot cost-benefit analysis.

196. *See, e.g.*, ACKERMAN & HEINZERLING, *supra* note 29, at 8 ("The basic problem with narrow economic analysis of health and environmental protection is that human life, health, and nature cannot be described meaningfully in monetary terms."); Kelman, *supra* note 29, at 38 ("To place a price on the benefit may, in other words, reduce the value of that benefit. Cost-benefit analysis thus may be like the thermometer that, when placed in a liquid to be measured, itself changes the liquid's temperature.").

197. For a clear explication, see Posner & Sunstein, *supra* note 180, at 549–52.

Some more moderate forms of the quantification objection concede that quantification is, at least in principle, possible, but that the practice of cost-benefit analysis involves some specific values that are difficult or impossible to quantify.[198] Among these putatively unquantifiable values are the welfare of animals, the existence value of the environment, and, perhaps most importantly, costs to future generations.[199]

These special—but, at least in the case of discounting, nonetheless common—cases raise important and difficult issues that go beyond the scope of this Article. In practice, OIRA asks agencies to employ "break-even analysis"—asking what the value of the difficult-to-quantify cost or benefit would have to be to justify the proposed rule, as a mental tool to access our intuitions on the elusive value.[200] Break-even analysis is at best an imperfect answer, and these special quantification questions remain significant. They may be best understood, not as a criticism of the desirability of cost-benefit analysis, but rather as a caution about its limits.

The special quantification problems add fuel to a narrower but stronger criticism of cost-benefit analysis: that the difficulty of reliably quantifying regulatory costs and benefits, combined with the costs of quantifying some costs and benefits at all, makes the costs of cost-benefit analysis outweigh its benefits. This criticism is especially salient for the commitment device, which proposes that agencies use cost-benefit analysis not just as a tool to aid their decisions, but also as an institutional structure to compel agency action and set agency and administration priorities.

The practice of cost-benefit analysis is conscious of the limitations of quantification. As Section II explained, many cost and benefit figures are ranges rather than figures, and rule-selection decisions appear less like solving an optimization problem and more like choosing from among a set of plausible options.[201]

The unreliability of the figures used in cost-benefit analysis is in large part a product of its snapshot character. This is the insight behind retrospective analysis. Reviewing how cost and benefit predictions have fared after implementation enables agencies to make more precise and accurate predictions

198. *See, e.g.*, DRIESEN, DYNAMICS OF LAW *supra* note 71, at 76 (outlining "[a] [m]ore [m]odest [c]ontinued [r]ole" for cost-benefit analysis); KYSAR, *supra* note 29, at 119.

199. *See, e.g.*, KYSAR, *supra* note 29, at 150–99.

200. OFFICE OF MGMT. & BUDGET, *supra* note 173, at 2 ("It will not always be possible to express in monetary units all of the important benefits and costs. When it is not, the most efficient alternative will not necessarily be the one with the largest quantified and monetized net-benefit estimate. In such cases, you should exercise professional judgment in determining how important the non-quantified benefits or costs may be in the context of the overall analysis. If the non-quantified benefits and costs are likely to be important, you should carry out a 'threshold' analysis to evaluate their significance. Threshold or 'break-even' analysis answers the question, 'How small could the value of the non-quantified benefits be (or how large would the value of the non-quantified costs need to be) before the rule would yield zero net benefits?' In addition to threshold analysis you should indicate, where possible, which non-quantified effects are most important and why.").

201. *See, e.g.*, Sunstein, *Arithmetic, supra* note 67, at 2257.

in the future, or at least to narrow the cost and benefit ranges.[202] The system of reanalyzing rules that the commitment device creates aims to improve the reliability of predictions even further, both by testing them empirically and by creating better long-run incentives for credibility among rulemaking participants.[203]

So while the commitment device does not offer an answer to special quantification problems such as the welfare of animals or the existence value of the environment, by allowing agencies to more accurately quantify the regulatory costs and benefits *that are* obviously quantifiable, the commitment device isolates the specific quantification problems. It therefore makes it less likely that the special quantification problems combine with generic quantification problems to make cost-benefit analysis not worth the costs.

Part of the appeal of quantification skepticism may come from the suspicion that cost-benefit analysis is not undertaken in good faith—that it is a smokescreen for an anti-regulatory agenda. That may well have been true when cost-benefit analysis was introduced in 1981. Indeed,

> [w]ithin a month of his inauguration in 1981, President Reagan issued Executive Order 12,291, asserting an unprecedented level of control of the administrative apparatus. . . . Agencies were required to prepare detailed cost-benefit analyses of proposed regulations with a significant impact on the economy, and if a regulation's expected costs exceeded its expected benefits, then the regulation could not go forward. . . . The new regime had many critics. Many feared that cost-benefit analysis was a code for deregulation, and this concern was not misplaced. Agencies received OMB's inputs so late in the rulemaking process that it was "virtually impossible to do anything productive about them." The size of OIRA's staff, which was tiny relative to the number of regulations it was meant to review, gave rise to costly and lengthy delays. Furthermore, the opacity of the new OMB review process led to fears that industries would be able to kill regulations contrary to their interests under cover of night. In short, critics worried that agencies would have less incentive to incur the large costs of promulgating regulations, and that the administrative state would grind to a halt. These fears were largely vindicated.[204]

But this criticism has become less plausible as administrations less opposed to the regulatory state have come to direct it, and would be further implausible

202. *See* Sunstein, *Lookback*, *supra* note 102, at 590–91 (explaining Greenstone's suggestions for making cost and benefit assessments more reliable).

203. Advances in information technology should also improve the reliability of the figures used in regulation. *See generally* Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115 (2004) (arguing that emerging technologies in data collection, analysis, and dissemination will create new information gap-filling options and expand the range of environmental protection strategies).

204. REVESZ & LIVERMORE, RETAKING RATIONALITY, *supra* note 30, at 25–27 (footnotes omitted). For a similar account, see DRIESEN, DYNAMICS OF LAW, *supra* note 71, at 29 ("Ronald Reagan . . . promulgated an executive order designed to 'reduce the burdens of . . . regulation.' He proposed to do this by mandating use of neoclassical law and economics' favorite analytical technique, CBA." (quoting Exec. Order No. 12,291, 3 C.F.R. § 127 (1982) (revoked 1993)).

under a commitment device regime that repeatedly tests the good faith of initial cost and benefit predictions and provides evidence on whether regulators are in fact smuggling anti-regulatory assumptions into those predictions.

Quantification skepticism would also pose a weightier objection if there were a consistent direction to the errors in cost and benefit predictions, but most studies that have addressed this question have not found that cost and benefit predictions systematically underestimate benefits or overestimate costs.[205] The commitment device would also institutionalize the collection of data on this question, so if a consistent direction of error did emerge, agencies could start to learn how and why they err in that direction.

The only part of the commitment device system that would give more effect to *initial* cost and benefit predictions is the trigger for reanalysis.[206] But even there, the party seeking to trigger the reanalysis must present evidence that technology has changed those calculations, and, once the reanalysis starts, the initial cost and benefit predictions serve only as presumptions subject to rebuttal with new information.

Ultimately, the case for cost-benefit analysis rests on the argument that, despite its limitations, its net benefits exceed those of alternative ways of making regulatory decisions. Likewise, the case for cost-benefit analysis as a commitment device is that it improves on other decision procedures for updating obsolete rules, inducing innovating in risk-reducing technology, and in setting agency and administration priorities.

B. From the Precautionary Principle to the Vigilance Principle

One prominent alternative to cost-benefit analysis for health, safety, and, especially, environmental regulation is the Precautionary Principle.[207] One salient formulation states that "[w]hen an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."[208]

What precisely the Precautionary Principle entails is not obvious. Because cost-benefit analyses generally ask what level of precautions should be taken—rather than whether precautionary measures should be taken at all—at least some variants of the Precautionary Principle appear to be compatible with cost-benefit analysis.

Stronger versions of the Precautionary Principle are more clearly incompatible with cost-benefit analysis, but also more difficult to defend. The standard criticism in the literature is that the Precautionary Principle gives an incoherent answer to the problem of risk-risk tradeoffs, situations in which both

205. *See, e.g.*, Sunstein, *Lookback*, *supra* note 102, at 586–88.

206. See *supra* Part II.C.2 an overview of how a reanalysis would be triggered under the commitment device.

207. For defenses of the precautionary principle, see ACKERMAN & HEINZERLING, *supra* note 29, at 224–29 and KYSAR, *supra* note 29, at 46–67.

208. *The Wingspread Consensus Statement on the Precautionary Principle*, SCI. & ENVTL. HEALTH NETWORK (Jan. 26, 1998), http://www.sehn.org/wing.html.

regulating and not regulating will result in some risk to health, safety, environmental, or other noneconomic harm.[209] Defenders of the Precautionary Principle have responded to this and related criticisms, with varying persuasiveness.[210]

But even though the Precautionary Principle is a problematic decision procedure for regulatory decision making, it is a powerful rhetorical vision for thinking about regulation. Its appeal may be attributable to cognitive bias:

> What accounts for the particular blinders that underlie applications of the Precautionary Principle? . . . [T]he availability heuristic, making some risks seem especially likely to come to fruition whether or not they actually are; probability neglect, leading people to focus on the worst case, even if it is highly improbable; loss aversion, making people dislike losses from the status quo; a belief in the benevolence of nature, making man-made decisions and processes seem especially suspect; system neglect, understood as an inability to see the risks are part of systems, and that interventions into those system[s] can create risks of their own.[211]

But one person's cognitive bias can be another's vivid intuition, and what the Precautionary Principle offers that cost-benefit analysis lacks is a vision of health, safety, and environmental regulation as a project *over time*. The Precautionary Principle immediately conjures images of the risk of irreversible catastrophe, of sickening a future generation with cancer or spoiling an environmental landscape with pollution—the "Silent Spring."[212] Against these

---

209. Sunstein, for example, defines the strong version of the Precautionary Principle as stating that "regulation is required whenever there is a possible risk to health, safety, or the environment, even if the supporting evidence remains speculative and even if the economic costs of regulation are high." CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE 24 (2005) [hereinafter SUNSTEIN, LAWS OF FEAR]. His attacks on it include this risk-risk tradeoff example:

> [C]onsider the case of genetic modification of food. Many people believe that a failure to allow genetic modification might well result in numerous deaths, and a small probability of many more. The reason is that genetic modification holds out the promise of producing food that is both cheaper and healthier—resulting, for example, in "golden rice," which might have large benefits in developing countries. My point is not that genetic modification will likely have those benefits, or that the benefits of genetic modification outweigh the risks. The claim is only that if the Precautionary Principle is taken literally, it is offended by regulation as well as by nonregulation.

Id. at 31.

210. For a recent summary of responses to criticisms of the Precautionary Principle, see Noah M. Sachs, *Rescuing the Strong Precautionary Principle from Its Critics*, 2011 U. ILL. L. REV. 1285, 1316–17 (2011).

211. SUNSTEIN, LAWS OF FEAR, *supra* note 209, at 35.

212. Frank B. Cross, *Paradoxical Perils of the Precautionary Principle*, 53 WASH. & LEE L. REV. 851, 851 (1996) (footnote omitted) (quoting *Environmentalism: Risking the Earth*, ECONOMIST, Sept. 16, 1995, at 99).

> The precautionary principle is not only a mantra of the green movement but also is fundamentally appealing to the "anxious millions who think it might often be better to be safe than sorry." The theory can be traced back to Rachel Carson's *Silent Spring,* the environmentalist bible that warned against human tampering with nature with particular reference to pesticides.

images, cost-benefit analysis's appeal to the inevitability of tradeoffs and the language of mathematics fails to inspire.

Unfortunately, the vision the Precautionary Principle portrays is a misleading guide for thinking about most actual health, safety, and environmental regulations over time for three reasons. First, most regulations are not the product of one dramatic, all-or-nothing decision about whether society should take a precaution. Rather, regulation is a process through which society gradually calibrates its precautions over time. Recall the history of lead regulation: there was no one decision point at which all forms of lead exposure went from unregulated to banned at any level.[213] Instead, the acceptable level of lead exposure was gradually reduced and the sources of lead exposure covered were gradually broadened.

Second, most health, safety, and environmental risks are not catastrophes. Many health, safety, and environmental risks create significant, but not massive, statistical probabilities of harm, often concentrated in specific industries, specific products, or specific regions, which is why analyzing their distributive effects is so important. When risks are truly catastrophic in nature, it sometimes is a good cost-benefit decision to regulate aggressively with very limited scientific evidence.[214] That does not mean the Precautionary Principle has trumped cost-benefit analysis in those cases; it just means that cost-benefit analysis and the Precautionary Principle *converge* in those cases. So the Precautionary Principle is redundant in true catastrophes and misleading in more common regulatory situations.

Third and most importantly, the Precautionary Principle does not cohere well with history. It was the fact of, as much as the fear of, widespread environmental damage that created the modern environmental movement. The polluted air and rivers of industrialization, growing knowledge of widespread industrial-era cancers, and increasing sympathy towards the brutality of worker conditions outraged and inspired early regulators.[215] Decades of regulation and

Id. (footnote omitted).

213. See *supra* notes 1–22 and the accompanying text for a discussion of the history of lead regulation in the United States.

214. Sunstein advocates following an Anti-Catastrophe Principle in rare cases of potential catastrophe. *See* SUNSTEIN, LAWS OF FEAR, *supra* note 209, at 109 ("If regulators are operating under conditions of uncertainty, they might well do best to follow maximin, identifying the worst-case scenarios and choosing the approach that eliminates the worst of these."). *But see* Gregory N. Mandel & James Thuo Gathii, *Cost-Benefit Analysis Versus the Precautionary Principle: Beyond Cass Sunstein's* Laws of Fear, 2006 U. ILL. L. REV. 1037, 1044 (2006) (book review) ("In sum, the Anti-Catastrophe Principle, as proposed, is applicable only to threats with an uncertain risk of catastrophe, where all relevant risks can be identified, where the costs of reducing the danger of the threat are not huge, and where response costs will not divert resources from more pressing needs. We suggest that decision making in such limited contexts is usually obvious by definition, rarely the subject of strenuous debate, and does not represent any of the significant threats discussed in *Laws of Fear*. In fact, Sunstein identifies no threats that he claims should be subject to the Anti-Catastrophe Principle as he constructs it.").

215. Kysar, for example, includes among his list of events that inspired the early environmental movement "the pollution-induced burning of the Cuyahoga River." KYSAR, *supra* note 29, at 3.

technological development have gradually strengthened protections of health, safety, and the environment. Some of the progress has come from a refusal to accept environmental degradation as irreversible.[216]

Instead of the Precautionary Principle, regulation should follow the Vigilance Principle: a vision of regulation as a gradual, but dogged, project to reduce risks to health, safety, and the environment over time, as society's knowledge about these risks—and the technological means to mitigate them—improve. Vigilance entails careful monitoring of the facts. If, for example, evidence accumulates establishing that hydraulic fracturing is creating the type of health and environmental risks that its detractors fear, vigilant regulators should intervene and act on that evidence. But vigilance also entails persistence in seeking new technological solutions to seemingly daunting risk-mitigation problems.

Cost-benefit analysis as a commitment device is a means to implement the Vigilance Principle, to enlist the administrative state in the process of gradually tightening regulation and inducing the technological progress that will justify that tightening. Like snapshot cost-benefit analysis, it accepts the reality of regulatory tradeoffs. But it is vigilant in the fight to change the substance of those tradeoffs over time.

CONCLUSION

Earlier-generation debates about cost-benefit analysis focused on the substantive choices regulators would face in analyzing proposed rules. They asked whether regulatory costs and benefits could be meaningfully quantified, and, if so, whether quantification would lead to better rules. Proponents of cost-benefit analysis repeated a simple argument: agencies need to have some method for deciding whether and how stringently risks should be regulated, and assessing the costs and benefits beats the plausible alternatives. Critics of cost-benefit analysis never converged on a satisfactory competitor, but their repeated slogan—that cost-benefit analysis means deregulation—continues to resonate.

I submit that critics' focus on the decision procedure for selecting rules was misplaced. The reason cost-benefit analysis has mostly served to constrain regulation is how it fits into the larger architecture of the regulatory state.

---

216. Irreversibility is also conceptually tricky. Sunstein explains:

> Whether a particular act is "irreversible" depends on how it is characterized; if we characterize it narrowly, to be precisely what it is, any act is literally irreversible by definition. 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 miniscule change in the global temperature, even if permanent, would not justify expensive precautions it if is benign or if it imposes little in the way of harm.

SUNSTEIN, LAWS OF FEAR, *supra* note 209, at 116.

Administrations and agencies use cost-benefit analysis to calibrate regulation, but snapshot calibration can only constrain, rather than compel, regulation.

Cost-benefit analysis need not be used this way. Using cost-benefit analysis as a commitment device is one possible way that agencies and administrations could use cost-benefit analysis to further the project of gradually reducing risks to health, safety, and the environment. Whether the benefits of the commitment device will outweigh its costs can only be determined over time.