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**Is Cost-Benefit Analysis the Only Game in
Town?**

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Gregory C. Keating

Abstract

Standards which prescribe more than efficient precaution against physical harm and health injury are commonplace in American environmental, health and safety regulation. The safe level standard, for example, requires the elimination of all significant risks. The feasibility standard requires the elimination of significant risks to the extent insofar as it is possible to do so without impairing the long run survival of the activities which give rise to the risks. These standards reach back more than a generation to the founding of the EPA and OSHA. You might think that they are too well-entrenched in American law to be subject to serious dispute. Yet these standards are now routinely decried as irrational or incoherent. Cost-benefit analysis, we are told, is the only game in town for determining appropriate standards of conduct for socially useful but risky acts. In a nutshell, the conventional wisdom is that cost-benefit analysis is rationality incarnate and the cost-justified level of precaution is the rational level of precaution. No matter how highly we value safety, the benefits of achieving a particular level of safety must be traded off against the costs of doing so. The rational way to trade costs off against benefits is to balance them so that we maximize net value and thereby make ourselves as well off as we can be. Taking more than efficient precaution yields less—not more—value. Preferring less value to more value is flatly irrational.

This paper argues that the charge of irrationality is mistaken. The feasibility and safety norms are directed against very serious harms—the kind of health injuries that deal out death and disability. Costs and benefits may be symmetrically important but harms and benefits are not. By virtue of its intimate connection to autonomy, the avoidance of harm has a special priority. There is nothing special about harm from an efficiency perspective; harms are simply costs and all costs

are comparable at some ratio of exchange. Harm's moral significance is connected to our separateness and independence as persons, and with our interest in securing the conditions necessary for us to be the authors of our own lives. Serious physical harms impair the pursuit of a wide range of human ends and aspirations, and deny normal human lives to those whose powers are impaired. Very few benefits, by contrast, are comparably essential conditions of effective agency. Benefit, like happiness, is mostly for each of us to pursue as best we can. In the domains to which they apply, the safety and feasibility standards are plausible expressions of the priority of avoiding harm.

IS COST-BENEFIT ANALYSIS THE ONLY GAME IN TOWN?

GREGORY C. KEATING*

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INTRODUCTION

In one of his columns, the economist Paul Krugman observed that “liberals don’t need to claim that their policies will produce spectacular growth. All they need to claim is feasibility: that we can do things like, say, guaranteeing health insurance to everyone without killing the economy.”¹ Krugman’s belief that providing everyone with health insurance is desirable unless doing so would “kill the economy” expresses a familiar, if debatable, position. Many of us believe that some goods should be provided to everyone, and they should be provided even if their provision comes at a cost in economic efficiency. The underlying belief is that some goods are essential to leading decent, independent lives, and their provision therefore has a special priority. As a society, we owe it to each other to secure the basic conditions necessary for people to lead decent and independent lives.

1. Paul Krugman, *Mornings in Blue America*, N.Y. TIMES (Mar. 27, 2015), <https://nyti.ms/2pOZffh>.

Like health, physical safety is a strong candidate for inclusion on a list of the essential conditions of a decent and independent life. Illness usually takes the form of physical harm, and accidental injury can impair basic powers of agency as much as ill-health can. Assertions that safety has priority over garden-variety “needs and interests” are commonplace in popular discourse.² You might, therefore, expect to find a debate in the legal literature on risk and precaution over whether or not safety, too, should be prioritized over efficiency and secured to the extent that it is feasible to do so. Prominent federal statutes take this very position. Indeed, they echo Krugman’s exact word choice in requiring that the risks of certain activities be reduced as far as it is “feasible” to do so, and they mean the same thing that he does in choosing this word. “Feasible risk reduction” requires that the risks in question be reduced as far as possible without killing the activity in question.³ A chorus of contemporary commentators, however, insists that feasible risk reduction is not just normatively mistaken; it is indefensible. Jonathan Masur and Eric Posner, for example, argue that statutes prescribing feasible risk reduction have no defensible normative underpinning. Feasibility analysis, they write, “does not reflect deontological thinking . . . [and] does not reflect welfarism in any straightforward sense,” and “[n]o attempt to reverse-engineer a theory of well-being that justifies feasibility analysis has been successful.”⁴ According to this line of thought, efficiency is the only plausible standard of precaution, and its handmaiden, cost-benefit analysis, is the only plausible test.⁵

Masur and Posner are not alone in contending that “cost/benefit analysis is currently the only game in town for determining appropriate standards of conduct for socially useful but risky acts.”⁶ Indeed, that particular phrase belongs to Barbara Fried. Fried’s target was not feasibility analysis in particular, but all self-described alternatives to cost-benefit analysis. Cass Sunstein, for his part, asserts that “[u]ncontroversial” considerations “suggest” that “[i]t is not possible to do evidence-based, data-driven

2. Jeff Plungis, *With Autonomous Cars, How Safe is Safe Enough?*, CONSUMER REP. (Feb. 28, 2017), <https://www.consumerreports.org/autonomous-driving/with-autonomous-cars-how-safe-is-safe-enough> (“Consumer Reports supports any new technology that advances the needs and interests of consumers, but at CR, we’re always going to make safety our priority.”).

3. See *infra* Part III.B.

4. Jonathan S. Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 707, 709 (2010). For criticism, see David M. Driesen, *Two Cheers for Feasible Regulation: A Modest Response to Masur and Posner*, 35 HARV. ENVTL L. REV. 313, 313–16 (2011).

5. Cost-benefit analysis is phrased in different ways, including “cost/benefit analysis” and “CBA.”

6. Barbara H. Fried, *The Limits of a Nonconsequentialist Approach to Torts*, 18 LEGAL THEORY 231, 231 (2012).

regulation without assessing both costs and benefits, and without being as quantitative as possible.”⁷ Cost-benefit analysis is necessary to bring discipline, reason, and rigor to our thinking about risk and regulation.⁸ Unless and until we embrace cost-benefit analysis, our thinking about risk and precaution will be ruled by rank sentimentality and cognitive error. Lately, courts have joined the chorus. The most recent Supreme Court decision on point asserts that—absent specific statutory instruction to the contrary—regulatory agencies must engage in cost-benefit analysis the moment that they contemplate regulating a harmful substance.⁹ It is irrational even to *contemplate* reducing harm without considering costs.¹⁰

My aim in this Article is to challenge this consensus. Descriptively, the claim that cost-benefit analysis is the only game in town is controverted by the fact that standards of precaution other than cost-benefit analysis are common in our law. Normatively, eminently defensible arguments can be marshaled in support of the safety and feasibility standards. Broadly speaking, the conflict is between an economic version of consequentialism and legal norms which express deontological commitments. Cost-benefit analysis has its home in a framework which supposes that welfare is the ultimate or master value and that promoting welfare is the proper end of political and legal institutions.¹¹ The distinctions among persons disappear

7. Cass R. Sunstein, Adm’r, Office of Info. and Regulatory Affairs, Humanizing Cost-Benefit Analysis, Remarks at American University’s Washington College of Law *Administrative Law Review* Conference (Feb. 17, 2010), https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/inforeg/cost_benefit_analysis_02172010.pdf [hereinafter Sunstein, Humanizing Cost-Benefit Analysis]. See also CASS R. SUNSTEIN, THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION ix, 19 (2002); Cass R. Sunstein, *Is Cost-Benefit Analysis for Everyone?*, 53 ADMIN. L. REV. 299, 300 (2001) (“[I]t would be premature to say that CBA has received the kind of social consensus now commanded by economic incentives and deregulation of airlines, trucking and railroads. Like Judge Williams, I believe that CBA should command such a consensus, at least as a presumption, and that the presumption in favor of CBA should operate regardless of political commitments.”); Cass R. Sunstein, *The Real World of Cost-Benefit Analysis: Thirty-Six Questions (and Almost as Many Answers)*, 114 COLUM. L. REV. 167, 170–71 (2014) [hereinafter Sunstein, *The Real World*]; Cass R. Sunstein, *Thanks, Justice Scalia, for the Cost-Benefit State*, BLOOMBERG VIEW (July 7, 2015), <http://www.bloomberglaw.com/view/articles/2015-07-07/thanks-justice-scalia-for-the-cost-benefit-state> (praising the Supreme Court’s decision in *Michigan v. EPA* “as a ringing endorsement of cost-benefit analysis by government agencies.”).

8. See CASS R. SUNSTEIN, RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT 6–7 (2002); Sunstein, *The Real World*, *supra* note 7, at 170 (“While serving as OIRA Administrator, I helped to implement Executive Order 13,563, ‘Improving Regulation and Regulatory Review,’ an exceedingly important document that places a high premium on analysis of costs and benefits. . . . Under Executive Order 13,563, agencies may proceed only if the benefits justify the costs and only if the chosen approach maximizes net benefits (unless the law requires otherwise).”).

9. See *Michigan v. EPA*, 135 S. Ct. 2699 (2015).

10. See *infra* note 26 and accompanying text.

11. Welfarism holds that human well-being is the only end worth pursuing in itself, and that everything else matters only insofar as it contributes to or detracts from well-being. See LOUIS KAPLOW

because the task of law and morality is to bring into existence states of the world in which overall welfare is as high as it can be. Risks to health and safety should therefore be managed by minimizing the combined costs of avoiding and suffering the harms in question, thereby maximizing the net benefit extracted from the activities responsible for those risks.

By contrast, the supposition “at the heart of deontological (or non-consequentialist)” moral theory is that the “subject matter of morality is not what we should bring about, but how we should relate to one another.”¹² On a deontological view, the distinction between persons is fundamental because the relations among persons are the fundamental subject of morality. The fundamental moral questions posed by issues of risk and precaution are questions about what people owe to each other.¹³ They are questions about the terms on which risks may be imposed by some and on others. Deontology justifies assigning special priority to avoiding harm because harm is presumptively and especially bad for persons. Harm *is* the impairment of basic powers of human agency.

By treating physical harm to persons as just another cost and by ignoring the distinction between persons, cost-benefit analysis misconceives

& STEVEN SHAVELL, FAIRNESS VERSUS WELFARE 5 n.8 (2002). It assumes both that welfare is the touchstone of economic analysis and that welfare is the only ultimate value. *See, e.g., id.* at 465. Most proponents of cost-benefit analysis identify it as welfarist. *See, e.g.,* PETER SCHUCK, WHY GOVERNMENT FAILS SO OFTEN 45 (2014) (citing KAPLOW & SHAVELL, *supra*) (“CBA is a welfarist decision-making tool, focusing on the actual consequences of policies for human well-being.”); Michael A. Livermore & Richard L. Revesz, *Rethinking Health-Based Environmental Standards and Cost-Benefit Analysis*, 89 N.Y.U. L. REV. 1184, 1190 (2014) (“Cost-benefit analysis . . . places both costs and benefits along a common metric and supports the standard that maximizes net benefits (the difference between benefits and costs). As practiced in the United States . . . cost-benefit analysis is grounded on a welfare economic conception of social good . . .”).

12. Rahul Kumar, *Contractualism on the Shoal of Aggregation*, in REASONS AND RECOGNITION: ESSAYS ON THE PHILOSOPHY OF T.M. SCANLON 129, 150 (R. Jay Wallace et al. eds., 2011) (quoting Christine Korsgaard, *The Reasons We Can Share: An Attack on the Distinction Between Agent-Relative and Agent-Neutral Values*, 10 SOC. PHIL. & POL’Y 24, 24–25 (1993)). ARTHUR RIPSTEIN, PRIVATE WRONGS (2016) is an excellent example of a deontological theory that takes what we owe to each other to be the central concern of the political morality of tort law. Masur and Posner characterize deontology by saying “the deontologist believes that acts should be evaluated on the basis of their own quality—for example, one should not (presumptively) lie even when lying has good consequences.” Masur & Posner, *supra* note 4, at 707. Just what Masur and Posner have in mind when they refer to the “qualities of acts” in this way is deeply obscure. The focus of the remark on the acts in themselves is, however, mistaken and misleading. Deontology focuses on the relations among persons, not on acts in themselves. Lying is presumptively wrong because it is a presumptively objectionable way for persons to treat one another. Fraud, like force, is an assault on autonomy. By deceiving its victims about the reasons that they have to act, fraud makes their wills the unwitting instruments of the wrongdoer’s will. This is a profoundly objectionable way for one person to treat another.

13. For criticism of the idea that welfare is a master value and argument that values are irreducibly plural, see T.M. SCANLON, WHAT WE OWE TO EACH OTHER 1–108 (1998).

problems of risk and precaution in a fundamental way. Harm, like rape or murder, is misunderstood when it is presented as something that has an optimal level. All harm is bad for the person who suffers it, even when it is justifiable and even when it is better for the person who suffers the harm to suffer it, not avoid it. It is right to lop off one of your limbs to save your life,¹⁴ but the resulting disability and disfigurement is bad. Lesser harm is still harm. Physical integrity is an essential condition of effective agency for everyone. Safety, therefore, is a value which can be properly realized only when it is properly distributed. Maximizing lives saved by summing costs and benefits across some population is not a way of providing everyone with an essential condition of effective agency. Because deontology takes the distinction between persons as fundamental and recognizes the priority of avoiding harm, it lends support to standards of precaution more stringent than cost justification. Our law is torn between standards of cost-justified precaution and norms of safe and feasible precaution because our law is torn between these two moral outlooks.

The paper proceeds as follows. Part I summarizes the three standards of precaution and the differences that divide them. The debate that this Article engages is worth having only if the parties to it accept that different standards of precaution exist—that there really are alternatives to cost-benefit analysis extant in our law. Summarizing the standards up front is therefore worthwhile even at the cost of some subsequent repetition. Part II focuses on the importance of the distinction between persons and the harm-benefit asymmetry. Cost-benefit analysis models social choice on individual choice and treats harms and benefits as symmetrically important. Both of these commitments are problematic. When some people have their lives devastated by accidental harms issuing out of advertently imposed risks from which others profit, it is a mistake to model social choice on individual choice. We must take the distinction between persons seriously and adopt principles which are justifiable from the standpoints of both the potential victims and the potential beneficiaries of the practices in question. When physical harm is at issue, treating costs and benefits as symmetrically important is likewise mistaken. Our moral intuitions and our legal institutions treat the avoidance of harm as more important than the conferral of benefit. This asymmetry makes sense within a framework which places persons and their essential interests at its center. When we focus on the essential conditions of effective agency, harms and benefits are not symmetrically important. Physical harms—death, disability, disease, and the like—rob us of normal and foundational powers of action. Few benefits, by

14. See 127 HOURS (Warner Bros. Pictures 2010).

contrast, comparably augment our basic powers of agency. Indeed, unsought benefits often diminish our autonomy by subjecting us to the wills and wishes of others. If I make it impossible for you to avoid listening to me play Mozart, I control the direction of your attention and the use of your time. Both are now governed by my will, not yours.

Parts III and IV dig into the safety and feasibility standards, as interpreted by the courts and as applied by regulatory agencies. They aim to show that coherent alternatives to cost-benefit analysis are, in fact, present in our law. Part V summarizes why the safety and feasibility standards constitute reasonable attempts to give the avoidance of harm its due.

I. THREE STANDARDS OF PRECAUTION

In legal discourse, the claim that cost-benefit analysis is the only plausible way to think about risk and precaution is articulated as a criticism of two other standards of precaution—namely, the “safe-level” and “feasibility” standards.¹⁵ Federal statutory standards governing health, environmental, and safety regulation often insist that some activity be made “safe” or that some risk be reduced to the point where further reduction would be “infeasible.” The regulation of air, food, and water quality is the principal habitat of the “safe-level” standard, and the regulation of occupational health and safety is the principal habitat of the feasibility standard. The three standards identify distinct levels of permissible risk imposition. Normally, they stand in linear, vertical relation to one another, with the safety standard tolerating the least risk and the cost-justification standard tolerating the most.¹⁶

A. SAFE, FEASIBLE, AND COST-JUSTIFIED PRECAUTION

The two standards of most interest to us—the safety and feasibility standards—deploy a relatively well-integrated set of concepts. The concepts of “safe level,” “feasible risk reduction,” and “significant” risk that form the

15. Michael Livermore and Richard Revesz, *supra* note 11, at 1265, refer to what I call “safe-level” analysis as “health-based analysis.” I shall sometimes refer to the “safe-level” standard as the “safety” standard.

16. It is debatable whether this relation is necessary. Arguably, there are circumstances where it is not cost-justified to engage in an activity in the first place and where the activity is also governed by feasibility analysis. In such a circumstance, feasible precaution will be less protective of safety than cost-justified precaution. None of the circumstances discussed in this Article fit this template. Examples that might fit the template involve freely chosen but very risky activities. Some people might argue that it is foolish to engage in some such activities (e.g., in “free solo” rock climbing). At the same time, it will be true that the risks of such activities cannot be reduced to insignificance because that would destroy the value of the activity.

core of both statutory standards are terms of art. The feasibility standard, for its part, is further broken down into technological and economic prongs. The legal regimes that the standards establish need to be understood in terms of these concepts; in relation to one another; in relation to the idea of cost-justified risk reduction; and in light of their usual domains of application.

1. The Safe-Level Standard

The Food Quality Protection Act of 1996¹⁷ embodies the safe-level standard. It requires that pesticide residue on fresh and processed foods be reduced to a “safe” level.¹⁸ “Safe,” in turn, means “there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures.”¹⁹ This standard is made even more stringent by instructing regulators to set limits that provide for an additional margin of safety in light of the special susceptibility of infants and children to harm from toxic substances.²⁰ Pesticide residue on food is thus acceptable only to the extent that it is reasonably certain to harm no one—not even those unusually vulnerable to harm. Applying the safe-level standard does not require any inquiry into the costs of risk reduction. All that it requires is a determination of the level at which the risk created by exposure to the regulated substance ceases to be significant.

Among the three standards, the safe-level standard tolerates the least risk. Safety-based regulations require risk to be reduced to a point where no “significant risk” of devastating injury remains. This may well require moving *beyond* the point of cost-justified precaution. If efficient precaution is taken and significant risk still remains, the safe level standard requires further reduction.²¹ The standard may therefore require precaution which presses beyond the point of maximum net benefit, as cost-benefit analysis conceives that point.

2. The Feasibility Standard

The feasibility standard is at least as salient in federal risk regulation as

17. Food Quality Protection Act of 1996, Pub. L. No. 104-170, 110 Stat. 1489 (codified as amended at 7 U.S.C. §§ 136–136y and in scattered sections of 21 U.S.C. (2012)). *See also, e.g.*, 42 U.S.C. § 7545(k)(2)(C) (demonstrating that clean air statutes can also incorporate safety-based regulation).

18. 21 U.S.C. § 346a(b)(2)(A).

19. *Id.*

20. *See id.* § 346a(b)(2)(C).

21. Efficient precaution is taken when the marginal cost of the next increment of precaution would exceed its marginal benefit (i.e., when a dollar more in precaution would yield less than a dollar’s worth of harm avoided).

the “safe-level” standard. The Clean Air Act, for example, provides that standards for hazardous air pollutants “shall require the maximum degree of reduction in emissions” that the EPA, “taking into consideration the cost of achieving such emission reduction,” determines to be “achievable.”²² Feasible risk reduction does not require the elimination of all significant risk. Feasible precaution calls for reducing an activity’s risks as far as possible consistent with the long-term flourishing of the activity. Because it requires that significant risks be reduced until (1) they are either insignificant or (2) further reduction would jeopardize the long-run health of the activity whose risks they are, feasible risk reduction may require pressing precaution beyond the point where a dollar more spent on the prevention of harm yields more than a dollar’s worth of harm prevented, and to the point where further risk reduction would endanger the activity.

3. The Cost-Benefit Standard and Its Claims

The basic idea of cost-justified risk imposition is easy to state, perhaps deceptively so. Cost-justified precaution requires risks to be reduced to the point where the costs of further precautions exceed their benefits. Cost and benefit, for their part, are all-encompassing concepts. In a well-known defense of cost-benefit analysis, the economist Robert Solow explained that “the cost of the good thing to be obtained is precisely the good thing that must or will be given up to obtain it.”²³ “Cost,” then, is anything given up to obtain something else. “Benefit” is the flip side of the coin—anything worth attaining whose attainment requires giving something up. An ideal cost-benefit analysis takes all costs and all benefits into account and identifies the point at which costs and benefits are balanced so that net benefit is maximized. In practice, almost all cost-benefit analyses take more restricted sets of costs and benefits into account. In the context of accidental injury, for example, the criterion of cost justification is usually said to “require minimizing the sum of the costs of precaution, accidental harm, and administrative costs.”²⁴

22. 42 U.S.C. § 7412(d)(2). This requirement is part of the 1990 Amendments to the Clean Air Act. Feasible risk reduction is a statutory standard in the Occupational Safety and Health Act of 1970, and it is in this context that it has received its most extensive application and articulation. *See infra* note 105 and accompanying text.

23. Robert Solow, Reply, *Defending Cost-Benefit Analysis: Replies to Steven Kelman*, REGULATION, Mar.–Apr. 1981, at 39, 40. Solow’s is one of several comments responding to Steven Kelman, *Cost-Benefit Analysis: An Ethical Critique*, REGULATION, Jan.–Feb. 1981, at 33. This debate between Kelman and Solow is helpfully reviewed in Douglas MacLean, *Cost-Benefit Analysis and Procedural Values*, 16 ANALYSE & KRITIK 166, 166–68, 171–72 (1994).

24. ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 237 (6th ed. 2016).

For our purposes, the important issue is not exactly how cost-benefit analysis is practiced, but why the cost-justified level of risk imposition is claimed to be the correct level of risk imposition. The answer to that question is straightforward. When we minimize the combined costs of preventing accidental harms (precaution costs) and paying for those harms that we do not prevent (accident costs), we maximize net benefit (benefit minus cost). We diminish net benefit if we take either more or less precaution. If we take more precaution, the increased marginal spending on precaution costs exceeds the increased marginal savings in accident costs. If we take less precaution, the marginal savings in precaution costs are exceeded by the marginal increases in accident costs. Net benefit thus diminishes if either more or less precaution is taken. This is why law and economics scholars like Masur and Posner conceive of the cost-justified level of precaution as *the* rational level of precaution. This conclusion is common. In a recent book, for instance, the legal scholar Peter Schuck writes:

Cost-benefit analysis posits that policy A is more desirable than policy B if and to the extent that the net benefits (i.e., benefits minus costs, including opportunity costs) that flow from A are larger than the net benefits that flow from B. So stated, CBA is simply rationality in the service of sound policy, a call for policies that maximize net benefits, a principle to which seemingly no sensible person could object.²⁵

Many courts, including the Supreme Court, seem persuaded. In its recent decision in *Michigan v. EPA*, the Court appeared to create a presumption that cost-benefit analysis is a requirement of a rational regulatory process.²⁶

From the point of view of orthodox cost-benefit analysis, the safety and feasibility norms *are* fundamentally irrational.²⁷ By design, these standards

25. SCHUCK, *supra* note 11, at 45.

26. See *Michigan v. EPA*, 135 S. Ct. 2699, 2707–08 (2015). See also Lisa Heinzerling, *The Power Canons*, 58 WM. & MARY L. REV. 1933, 1963–66 (2017). But see generally Amy Sinden, *A “Cost-Benefit State”? Reports of Its Birth Have Been Greatly Exaggerated*, 46 ENVTL. L. REP. 10,993 (2016) (arguing that recent case law does not embrace cost-benefit analysis to the extent commonly assumed). *Michigan v. EPA* embraces the proposition that when an agency charged with administering a statute interprets an ambiguous provision to permit the agency not to consider costs before deciding to regulate, the agency will likely lose because ignoring costs is irrational, and impermissible absent specific Congressional authorization to do so. *Michigan v. EPA*, 135 S. Ct. at 2707–08. See also *MetLife, Inc. v. Fin. Stability Oversight Council*, 177 F. Supp. 3d 219, 239–42 (D.D.C. 2016) (citing *Michigan v. EPA*, 135 S. Ct. at 2705–07, 2709–10, in holding that the FSOC *must* consider cost when making a determination of a systematically important financial institution—in other words, when determining that a financial institution is “too big to fail,” and therefore subject to heightened government oversight.).

27. Orthodox cost-benefit analysis embodies the Kaldor-Hicks or potential Pareto-superiority criterion of efficiency. That criterion maximizes net benefit. See MATTHEW D. ADLER, WELL-BEING AND FAIR DISTRIBUTION: BEYOND COST-BENEFIT ANALYSIS 98–99 (2012) (defining Kaldor-Hicks efficiency); Matthew D. Adler, *Cost-Benefit Analysis*, in 1 ENCYCLOPEDIA OF LAW AND SOCIETY:

prescribe levels of precaution which go beyond the cost-justified level of safety. Safety may be precious but it comes at a cost, and its value is not infinite. The benefits of achieving a particular level of safety must be traded off against the costs of doing so. The rational way to trade costs off against benefits is to balance them so that we maximize net value and thereby make ourselves as well off as we can be. We should spend on safety up to the point where a dollar more spent on preventing accidents yields less than a dollar's worth in the way of accidental harm avoided. Spending beyond this point—beyond the point of efficient precaution—yields less value, not more value. Preferring less value to more value is simply illogical.²⁸

On its own terms, this is a knockdown argument. The terms of the argument, however, are problematic. Though cost-benefit analysis sometimes claims the mantle of common sense, it is in fact the child of a theory, and the theory on which it rests makes a controversial assumption about the fungibility of everything that might be gained or lost.²⁹ Cost-benefit analysis of risks to health and safety is an attempt to extend a market mode of valuation and choice to areas where actual markets fail—where actual markets either do not exist or are incomplete and imperfect. The safety and feasibility norms address risks to life and limb. By name, there are no markets in people's lives, and the markets that do exist are, at best, badly incomplete.³⁰ Even so, we might think about risks to life in market terms. Thomas Schelling inaugurated the modern cost-benefit analysis of risks to

AMERICAN AND GLOBAL PERSPECTIVES 304, 304–06 (David S. Clark ed., 2007). In the context of health and safety regulation, orthodox cost-benefit analysis recommends monetizing all of the costs and all of the benefits of a regulation in order to compute net benefit. Heterodox forms of cost-benefit analysis make various allowances and adjustments. See, e.g., MATTHEW D. ADLER & ERIC A. POSNER, *NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS* 129–30 (2006).

28. The proposition that it is irrational to act in ways which do not maximize net benefit is a piece of the thesis of KAPLOW & SHAVELL, *supra* note 11, at 15–17. In a representative passage, they write “[u]nder any method of evaluating social policy that accords positive weight to a notion of fairness, there must exist situations in which *all* individuals will be made worse off.” *Id.* at xviii. Maximizing net benefit makes it possible for everyone to be better off than they would be in a world with less net value. There is more value to go around. Some of the time, it should be possible to distribute a share of that increased value to everyone.

29. See, e.g., SCHUCK, *supra* note 11, at 48–49; Robert H. Frank, *Why Is Cost-Benefit Analysis So Controversial?*, 29 *J. LEGAL STUD.* 913, 913 (2000) (noting that many find it “hard to imagine” that anyone could disagree with the “commonsensical” principle that we should take only those actions whose benefits exceed their costs). Another proponent of cost-benefit analysis is eager to repudiate “reductionist utilitarianism,” and concedes that it is not easy “to put dollar values on noneconomic benefits,” but defends cost-benefit analysis and its commitment to pricing as “an effort to find some common measure for things that are not easily comparable.” Doing so is a pragmatic necessity “when, in the real world, choice must be made.” James DeLong, Reply, *Defending Cost-Benefit Analysis: Replies to Steven Kelman*, *REGULATION*, Mar.–Apr. 1981, at 39, 39.

30. As has long been recognized. See GUIDO CALABRESI, *THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS* 205–08 (1970).

life and limb not by discovering markets that no one had previously noticed, but by pointing out that we can view the question of “what [it is] worth to reduce the probability of death” as a “consumer choice.”³¹ “We nearly all want our lives extended and are probably willing to pay for it.”³²

When we think of risk and precaution as “consumer choices” we do indeed compare costs and benefits and seek to maximize net benefits. And we try to make our thinking more rigorous and precise by quantifying it—by putting prices on the various costs and benefits.³³ In deciding whether or not some automobile safety improvement—backup cameras which avert a certain number of deaths per year, say—is worth installing, cost-benefit analysis asks us to figure out if the lives saved are worth the costs of saving them. The dominant approach to doing this is to construct a value of life figure (e.g., \$5,000,000) and then to estimate how many lives the safety device would save.³⁴ That benefit—the monetary value of the lives saved—is then compared to the cost of the safety device to see if the installation of the safety device is net beneficial or not. Conceptually, the lives of potential victims (ideally, as valued by the victims themselves) are an economic resource, properly traded on the market and properly sacrificed when the benefit of saving life is less than the cost of doing so.

The conceptual and practical problems of pricing lives and other nonmarket goods are substantial. Our concern, however, is why the argument for efficient precaution is not the knockdown that it seems to be. The hidden normative weaknesses in the apparently knockdown case for cost justification as a uniquely rational standard of justified precaution are the conflation of individual choice with social choice and the assumption that all costs and all benefits are fungible in the way that all goods on a market are fungible. Because cost-benefit analysis aspires to mimic the market it treats *all costs and benefits as fungible at some ratio of exchange*. “[E]conomics . . . envisages rational man as seeking many goals, all substitutable at the margin. On the margin, economic man is prepared to trade off some freedom for some security, some privacy for some wealth, some freedom for some paternalism, and vice versa”³⁵ There is always some rate of exchange at which a rational person is willing to accept less of some good in exchange

31. THOMAS C. SCHELLING, *The Life You Save May Be Your Own*, in CHOICE AND CONSEQUENCE 113, 113–14 (1984).

32. *Id.* at 115. See also Gary T. Schwartz, *The Myth of the Ford Pinto Case*, 43 RUTGERS L. REV. 1013, 1025–26 (1991).

33. See, e.g., Sunstein, *Humanizing Cost-Benefit Analysis*, *supra* note 7.

34. See Schwartz, *supra* note 32, at 1020.

35. Harold Demsetz, *Professor Michelman's Unnecessary and Futile Search for the Philosopher's Touchstone*, 24 NOMOS 41, 44 (1982).



for more of another.

The safety and feasibility standards presuppose a perspective which insists upon the separateness of persons, and denies the fungibility of all costs and all benefits. From one angle, this denial rests on a claim about people's interests. The safety and feasibility standards presume that the people have an especially urgent interest in safety, because the physical integrity of one's person is an essential precondition of effective agency and a decent life. From another angle, the safety and feasibility standards are making an assertion about value. Kant claimed that rational beings have dignity, and that beings which have dignity are "above all price and therefore admit[] of *no equivalent*."³⁶ Perhaps because the phrase "above all price" is subject to more than one interpretation, this statement is sometimes taken to mean that human lives have infinite value, economically speaking. This interpretation of Kant's remark badly misunderstands him by taking him to be speaking within economics.

A better way to read Kant's remark is as an objection to the extension of the price system to the valuation of human life. In the price system, value is conferred by the expression of preferences. Prices reflect the revealed preferences of buyers and sellers for some good. Nothing—not the *Mona Lisa*, not the right to vote, not persons themselves—has intrinsic value. The "price" of a person's life is fixed by the demand of others for that life and the cost to the person of giving it up. For Kant, persons have intrinsic value. Principles of justice must register that value correctly by according proper respect to persons and their claims. One feature of this view is that persons are ends in themselves, not objects of consumption for others. Another feature is that persons are not interchangeable. Each and every human life is not only intrinsically valuable, it is also unique and therefore irreplaceable. Unlike commodities, human lives are neither available for consumption by others, nor fungible with each other at some ratio of exchange. Each of us has only one life to live. From our separate perspectives, other people's lives are not substitutable for our own. Consequently, it is a mistake to subject risks to human life to the metric of the market. Registering the distinctive value of human lives is a desideratum that acceptable principles of risk imposition must meet. The question facing the safety and feasibility standards is whether or not they register properly the distinctive value of

36. IMMANUEL KANT, *GROUNDWORK OF THE METAPHYSICS OF MORALS* 42 (Mary Gregor & Jens Timmermann eds. & trans., Cambridge Univ. Press 1998) (1785) (emphasis added). Rawls explains that the priority of the basic liberties rests in part on the premise that not all interests are fungible at some ratio of exchange. JOHN RAWLS, *The Priority of the Basic Liberties*, in *JUSTICE AS FAIRNESS: A RESTATEMENT* 104, 105 (2001).

human life in the contexts to which they apply.

B. DO THE STANDARDS REALLY IDENTIFY DIFFERENT LEVELS OF PRECAUTION?

The safety and feasibility standards were born in the 1960s and 70s, in the last great flowering of liberal legal reform, and are championed by the political left. They have their roots in the founding of the Environmental Protection Agency (“EPA”) in 1970 and the Occupational Safety and Health Administration (“OSHA”) in 1971. They dominated the regulatory landscape into the 1980s, and they received important legislative reaffirmation during the 1990s—as the Food Quality Protection Act of 1996 itself shows.³⁷ Early in the 1980s, however, the political right began championing cost-benefit analysis and cost-justified precaution as its preferred alternative to safe and feasible risk reduction. In 1982, the Reagan Administration put into place an executive order requiring cost-benefit analysis for all “significant” federal regulations unless conducting such analysis was prohibited by law—if, for example, the authorizing statute itself forbade consideration of cost.³⁸ Since the early 1980s, the two approaches have been engaged in a prolonged tussle.

This struggle is worth continuing only if the standards really do identify different levels of required precaution. It is plain from what has been said so far that the standards express different normative judgments. The following examples show that these three standards identify different levels of precaution in important cases. There are, to be sure, costs to using examples drawn from other domains. In various ways, the circumstances to which the safety, feasibility, and cost-justification standards apply in these examples differ from the circumstances contemplated by federal health and safety

37. Only two of “ten major environmental regulatory statutes enacted in the 1960s, 1970s and 1980s . . . expressly authorize the balancing of benefits and costs for core agency actions.” Jonathan Cannon, *The Sounds of Silence: Cost-Benefit Canons in Entergy Corp. v. Riverkeeper, Inc.*, 34 HARV. ENVTL. L. REV. 425, 426 (2010).

38. Exec. Order No. 12,291, 3 C.F.R. 127 (1981 Comp.) (revoked 1993). The courts have long held that the major environmental and occupational safety statutes forbid consideration of cost. In 2001, a unanimous Supreme Court held that the EPA “may not consider implementation costs” in setting ambient air quality standards under the Clean Air Act. *Whitman v. Am. Trucking Ass’ns*, 531 U.S. 457, 486 (2001). Writing for the court, Justice Scalia observed that “[w]ere it not for the hundreds of pages of briefing respondents have submitted on the issue, one would have thought it fairly clear that this text does not permit the EPA to consider costs in setting standards. . . . The EPA . . . is to identify the maximum airborne concentration of a pollutant that the public health can tolerate, decrease the concentration to provide an ‘adequate’ margin of safety, and set the standard at that level.” *Id.* at 465. *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208 (2009), may represent a slight retreat from this position. See Cannon, *supra* note 37, at 443–52.



statutes. Liability under the common law, for instance, is *ex post*, whereas regulation is *ex ante*. This is an important difference. The differences in circumstances of application, however, have their benefits as well as their costs. The standards of precaution remain the same across domains. The differences in context therefore cast the distinctive demands of the standards themselves into sharp relief.

1. The Safety Standard: Consumer Expectations

In the United States, the two most common tests of product design defectiveness are the risk-utility test and the consumer-expectation test. Law and economics scholars usually take the risk-utility test to be an application of cost-benefit analysis to product design.³⁹ By contrast, in some applications the consumer-expectation test works as a “safe-level” standard. Whereas the risk-utility test focuses on product design from the perspective of a product engineer, the consumer-expectation test focuses on product performance from the perspective of the user.⁴⁰ Sometimes people expect products to be safe—not perfect, but safe. And sometimes a product which passes muster under the risk-utility test is not safe. *Green v. Smith & Nephew AHP, Inc.*, illustrates this kind of circumstance nicely.⁴¹ Plaintiff Green worked as a medical technologist in a hospital:

Her job required her to wear protective gloves while attending patients, up to 40 pairs of gloves per shift. She wore powdered latex gloves manufactured by [the defendant. After a period of prolonged use] . . . Green experienced increasingly severe health problems—cold-like symptoms, wide-spread rash, acute shortness of breath. She was hospitalized four times. In 1991 Green was diagnosed with latex allergy. Given her allergy, Green must avoid contact with latex. So she had to change jobs and must limit the items she buys, things she eats, and activities she pursues. On account of the allergy, Green developed asthma.⁴²

Exposure to latex proteins “sensitizes” some people to latex. Subsequent exposure of a sensitized person may produce progressively worse allergic reactions, including irreversible asthma and life-threatening anaphylactic shock (which Green suffered). Since latex allergy is caused

39. See, e.g., Alan Schwartz, *Proposals for Products Liability Reform: A Theoretical Synthesis*, 97 YALE L.J. 353, 386–88 (1988) [hereinafter Schwartz, *Proposals*]. See also Alan Schwartz, *The Case Against Strict Liability*, 60 FORDHAM L. REV. 819, 820, 824 (1992).

40. See, e.g., Schwartz, *Proposals*, *supra* note 39, at 384–85.

41. *Green v. Smith & Nephew AHP, Inc.*, 629 N.W.2d 727 (Wis. 2001).

42. KEETON ET AL., *TORT AND ACCIDENT LAW* 975–76 (4th ed. 2004). See also *Green*, 629 N.W.2d at 732 (summarizing the facts of Ms. Green’s case).

mainly by use of latex gloves, it disproportionately afflicts health care workers. According to the evidence that Green put forward at trial, the frequency of latex allergy among health care workers in the United States is 5 to 17%. At the time that Green became sensitized to latex, the medical community was unaware of the possibility of latex allergy.

Because latex allergy was unknown until the use of latex gloves became widespread, if Green's claim were judged by the risk-utility test it would most likely have failed.⁴³ The cost of discovering the defectiveness of latex gloves years before that defect manifested itself in health injuries to regular users was surely high. Indeed, it might have been impossible to discover the hazardous effects of long-term use of latex gloves in any way other than through widespread use of such gloves over a prolonged period of time. When Wisconsin evaluated the gloves under the expectation test, however, plaintiff's claim prevailed. The consumer-expectation test measures product defectiveness by asking if a product is "dangerous to an extent beyond that which would be contemplated by the ordinary user or consumer."⁴⁴ That defendant's latex gloves were defective under the expectation test seemed self-evident to the court. The users of defendant's gloves reasonably expected that they would not suffer injury from normal use of the product. Consequently, the court did not bother to state the relevant expectation precisely.⁴⁵ However, it does not seem difficult to do so. All of us reasonably expect that wearing ordinary clothing will not put us at significant risk of serious physical harm. Rare cases of severe allergic reaction to a fabric may

43. The outcome under the risk-utility test depends greatly on whether that test is applied with foresight or hindsight. The trend is to apply the test with foresight. For an example of a case with virtually identical facts where the court refused to apply the expectation test and refused to impose liability under the risk-utility test, see *Morson v. Superior Court*, 109 Cal. Rptr. 2d 343, 355–59 (Ct. App. 2001).

44. *Green*, 629 N.W.2d at 738.

45. The *Green* opinion would have been better if the court had discussed just what kind of expectation was disappointed by the product failure. Not every consumer expectation is reasonable. On the one hand, some expectations are mere wishful thinking. It would, for example, be wishful thinking to expect that no user would ever have an allergic reaction to a product. Idiosyncratic reactions exist. A one-in-a-billion susceptibility to illness does not impugn a product's safety under the expectation test. We take the one-in-a-billion reaction to reflect a rare sensitivity on the part of the victim. What is surprising and disappointing about latex gloves is that *so many* users (5 to 17%) suffer severe harm. On the other hand, it asks too much to expect consumers to form expectations about underlying mechanisms of possible product malfunction. Green would not have been in a position to say, "At the time of use, I expected that wearing gloves containing high levels of latex proteins would not exacerbate a user's prior susceptibility to allergic reaction." The *Green* court agreed with the defendant that "most consumers . . . generally do not have expectations about . . . technical or mechanical design aspects of the product." It disagreed as to whether such expectations are necessary. *Id.* at 741–42. What it did find necessary was a secure and reasonable expectation about product performance. *Id.* at 739. See also ROBERT E. KEETON ET AL., *TEACHER'S MANUAL TO ACCOMPANY TORT AND ACCIDENT LAW: CASES AND MATERIALS* 20-1 to -4 (4th ed. 2005).

exist, but typically a person's health is not seriously endangered by wearing clothes fashioned from a particular fabric. Analogously, health care workers in Green's position reasonably expected that wearing protective gear would not put them at significant risk of disabling physical harm. Plaintiff might reasonably have said "when I was using these gloves, I expected that their normal use would not cause me, a normal user, to become severely ill." Generalizing, we may say that clothing is a simple and familiar example of a product that we normally expect to be safe. In saying that, we mean that we believe that that the clothes we ordinarily wear do not put us at significant risk of physical harm. The question of whether this expectation is cost-justified never arises.

2. The Feasibility Standard: Rescues

The literature on "statistical lives" is haunted by the apparent irrationality of many rescues.⁴⁶ Money seems no object when miners are trapped, or when children are cornered in a burning building. From an economic perspective this seems foolish and extravagant. The rational way to budget our "rescue money" is to maximize the number of lives saved with the least sacrifice of other objectives. It is irrational to treat identified lives as more valuable than statistical ones. Lives are lives, and the extra money spent rescuing identified persons might be better spent on safety measures that would save more lives, full stop. This is simply an application of the standard argument for cost-justified precaution to the special case of rescues.⁴⁷ However, when actual lives are endangered, we think it would be

46. The term "statistical lives" was coined by SCHELLING, *supra* note 31, at 115. Schelling distinguished statistical lives from "identified" ones. Identified lives are actual persons who will live if certain steps are taken and die if they are not. *See id.* Statistical lives are abstract lives; they are the lives that will be saved down the road if some precaution is taken, or some safety program is implemented. Statistical lives are not identifiable at the time a precaution is taken, and may remain unidentifiable even after a precaution has been implemented and has saved lives. The phenomenon had been recognized before Schelling named it. *See* Guido Calabresi, *The Decision for Accidents: An Approach to Nonfault Allocation of Costs*, 78 HARV. L. REV. 713, 716 (1965). For valuable discussion, see CHARLES FRIED, AN ANATOMY OF VALUES 207–33 (1970); Johann Frick, *Contractualism and Social Risk*, 43 PHIL. & PUB. AFF. 175, 181, 212–18 (2015); Kenneth W. Simons, *Statistical Knowledge Deconstructed*, 92 B.U. L. REV. 1, 8–9 & n.12 (2012). *See also* Dan Brock & Daniel Wikler, *Ethical Challenges in Long-Term Funding for HIV/AIDS*, 28 HEALTH AFF. 1666, 1671–72 (2009). *See generally* I. GLENN COHEN, NORMAN DANIELS & NIR EYAL, IDENTIFIED VERSUS STATISTICAL LIVES: AN INTERDISCIPLINARY PERSPECTIVE (2015).

47. The questions raised by the distinction between "statistical" and "identified" lives in the rescue context are multiple and difficult. For one thing, if we suppose that even the best of precautions will not prevent all accidents, it may be eminently rational in even a cost-benefit sense to commit ourselves in advance to rescue practices which look extravagant at the time we undertake them. For another, *contra* SCHELLING, *supra* note 31, at 114–15, the distinction between identified and statistical lives may make a major moral difference. Obligations may be owed to actual persons, but not to theoretical constructs. *See*

unseemly, and probably morally wrong, to undertake a cost-benefit analysis of the value of the lives at stake and the cost of saving them. We rescue the victims if we can, and rescuers often take great risks upon themselves in the course of rescues and attempted rescues.⁴⁸ Generally speaking, our rescue practices appear to be governed by a norm of feasibility, not by a norm of efficiency.

A particularly striking example of this practice is the military tradition of undertaking rescues to recover the *corpses* of slain soldiers. In the introduction to his book on the American war in Vietnam, Philip Caputo observed that “[t]wo friends of mine died trying to save the corpses of their men from the battlefield. Such devotion, simple and selfless, the sentiment of belonging to each other, was the one decent thing in a conflict noted for its monstrosities.”⁴⁹

It is hard to believe that the actions Caputo so admires were cost-justified. Losing a life to save a corpse seems like a bad trade. But it also seems correct to say that the economic mindset of cost-benefit analysis is out of place here. There is something morally obtuse—perhaps even grotesque—about trying to figure out if losing one’s life in the course of attempting to rescue the corpse of a fallen comrade is a potential Pareto improvement or not. Rescuing the bodies of one’s fallen comrades is about solidarity and sacrifice, not about improving one’s own welfare. Attempting such rescues in the face of great danger is a way of honoring a deeply-held value.

The rescue of corpses on the battlefield is, of course, an extreme example, even among rescues, but it teaches important lessons about less extreme cases. For one thing, all rescues involve the affirmation of a common value. Solidarity may be as good a name as any for that value. The plight of trapped miners differs from the plight of fallen comrades, but it too

Frick, *supra* note 46, at 213–18. These complexities are beyond the scope of this Article.

48. Rescues give the question of appropriate precaution a particular posture. The question is not what risk some people may impose on others, but what costs—including risks of death—rescuers may reasonably take upon themselves to save the lives of others. The important common law case *Eckert v. Long Island Railroad Co.*, 43 N.Y. 502, 505–06 (1871), has this posture, too, with the *Eckert* court’s analysis of whether the rescue was prudent appearing to have been governed by a norm of possibility or feasibility.

49. PHILIP CAPUTO, *A RUMOR OF WAR*, at xv (1977). I owe the Caputo example to Douglas MacLean, *supra* note 23, at 172. A more recent example can be found in the 1993 Battle of Mogadishu, when the United States sent soldiers to rescue the crews of downed Black Hawk helicopters notwithstanding the enormous risk involved; two soldiers were posthumously awarded the Medal of Honor—the highest military honor in the United States—for sacrificing their own lives in the attempt. *See generally* MARK BOWDEN, *BLACK HAWK DOWN: A STORY OF MODERN WAR* (1999); *BLACK HAWK DOWN* (Revolution Studios 2001).

implicates solidarity. The fate of trapped miners moves us in part because we are all in this together.⁵⁰ We are all vulnerable to accidents and premature death. Honoring the value of solidarity does not deny the value of efficiency; it merely asserts that solidarity matters more in the context of rescues. In the very special context of the military, solidarity is even more important. The goods intrinsic to military excellence can only be realized if mutual commitment and sacrifice are valued very highly. There is nothing irrational about this. It is eminently rational to believe that some very valuable human goods cannot be realized unless we recognize that “no man is an island,” and when the bell tolls for one of us, it tolls for all of us.

It is, no doubt, romantic to extend the ideal of solidarity from the battlefield to the ordinary workplace, but it is on point to say that the adoption of the feasibility standard in the context of workplace safety is a way of valuing the lives of those who are exposed to serious occupational hazards. Even military rescues of corpses are governed by a standard of feasibility in an instructive way. It is heroic to attempt to recover the bodies of your fallen comrades only if there is some chance of succeeding. Without that possibility, an attempted rescue may be foolish or tragic (or both), but it is not noble or heroic. Like feasible risk reduction, rescue is governed by a norm of possibility.

3. Cost Justification and Commensurability: Private Necessity

If cost-justified precaution is not the proper principle for regulating serious harms to persons, the flip side of the coin is that the criterion of cost justification is appropriate for regulating harm to goods that are fungible and replaceable. The doctrine of private necessity articulated in the famous case of *Vincent v. Lake Erie Transport Co.* illustrates this point nicely.⁵¹ There are two issues in *Vincent*. The first is whether the ship owner should have been given a privilege to tie up at the plaintiff’s dock in order to avoid near-certain destruction in a sudden and fierce winter storm. The second is whether such a privilege should be conditional. If the privilege is conditional, the defendant must make good any harm that it did to plaintiff’s dock in the course of saving its ship. The court answered both questions affirmatively.⁵²

Vincent is a case where efficient precaution is the proper standard of precaution. The dock and the ship are fungible pieces of property. The metric of money is well-suited to measure both the damage done by bashing the

50. See *THE 33* (Warner Bros. Pictures 2015).

51. *Vincent v. Lake Erie Transp. Co.*, 124 N.W. 221, 221–22 (Minn. 1910).

52. *Id.*

dock and the damage avoided by keeping the ship out of the storm. Because the goods involved are fungible, the rational course of action is to minimize combined harm and maximize combined benefit. Moreover, the question of who should bear the cost of the ship's salvation—the ship owner or the dock owner—can be addressed after the harm has been done. Rightly, I think, the court concluded that fairness required the ship owner to bear the costs of its ship's salvation. Fair distribution could be effected after the dock was damaged simply by requiring the defendant to pay appropriate money damages to the plaintiff. As we shall see, matters are different when serious harm to persons is involved because such harm is not fully repairable. Fairness must be done *ex ante*.

The standards applied in these examples value the avoidance of harm differently. The application of the consumer-expectation test to latex gloves in *Green* is the most stringent. *Significant* risk of harm to normal users is unacceptable. Latex gloves are defective because they precipitate severe allergic reactions in a significant number of users, not an idiosyncratic few. This is the safety standard, in common law guise. It is very demanding, but it does not demand absolute safety. Rescue cases, for their part, are implicitly governed by a standard of possibility. It is noble and heroic to try to save the corpses of your comrades only if it is possible to succeed in doing so. Eliminating significant risks of harm to the extent possible (that is, without crippling the activity that generates the risk) is the basic commitment of the feasibility standard. On the one hand, this feasibility standard tolerates more risk of harm than the safety standard does. On the other hand, it tolerates less risk than the norm of cost justification implicitly applied in *Vincent*. The norm of cost justification assigns no priority to avoiding harm. It trades harm—here, in the form of property damage—against other goods in a way which maximizes net benefit.

In short: the safety standard insists on the lowest level of risk; the cost-justification standard accepts the highest level; and the feasibility standard falls in the middle. None of the standards insist on absolute safety. All three standards specify permissible tradeoffs. However, they vary significantly in the tradeoffs that they license.

II. THE SEPARATENESS OF PERSONS AND THE ASYMMETRY OF HARM AND BENEFIT

A. INDIVIDUAL AND INTERPERSONAL CHOICE

Implicit both in Thomas Schelling's observation that we can view the question of "what [it is] worth to reduce the risk of death" as a "consumer

choice” and in his general thesis that “the life you save may be your own” is an invitation to think about matters of risk and precaution as individual choices.⁵³ Consider the purchase of a new car. It seems perfectly prudent for a prospective purchaser to evaluate the desirability of purchasing an optional accident-avoidance system by comparing the value of the accidents avoided to the value of the other goods one might purchase with the money it costs to add the option. In other cases, however, treating safety decisions as wholly individual would strike us as wildly inappropriate. For example, imagine a peculiar person who is attracted to the idea of exposing himself to the level of risk involved in climbing K2, but who is utterly averse to the deprivation and intense exertion of mountaineering. To tailor his life to his special taste for both risk and indolence, he hits on the idea of rigging up his car with an external gas tank so that even a minor fender-bender might prove fatal. Because this way of pursuing his preferences for his own life seriously endangers others, we do not think the decision is properly treated as a purely individual one.

The cost-benefit analysis of risk of death is far from indifferent to the distinction between these cases. It is keenly aware that the second case involves a major negative externality, whereas the first does not. But it responds to the difference between them in a distinctive way. Cost-benefit analysis instructs us to think about circumstances where the actions of some negatively impact the lives of others by incorporating the benefits to some and the costs to others into a single calculus of risk and benefit. In doing so, cost-benefit analysis models social decision on an intuitively appealing conception of individual rationality. In many circumstances, the prudent thing for each of us to do is to balance the costs and benefits of alternative courses of action and choose the action that is most net beneficial. The extension of this conception to the circumstances of social choice, where costs and benefits fall on different people, is much less attractive. By combining all costs and all benefits into a single calculus of risk, cost-benefit analysis eclipses “the distinction between persons.”⁵⁴

Taking the distinction between persons seriously directs our attention not to overall welfare, but to interpersonal fairness. Fairness is a distinct domain of political morality, different from both the domain of rights and the domain of efficiency. Efficiency is primarily concerned with overall welfare; rights are primarily concerned with protecting individual interests.⁵⁵

53. See SCHELLING, *supra* note 31, at 113–14.

54. Here, cost-benefit analysis inherits the weakness of utilitarianism, its parent philosophy. For the pertinent criticism of utilitarianism, see JOHN RAWLS, *A THEORY OF JUSTICE* 24–29 (rev. ed. 1999).

55. See JOSEPH RAZ, *The Nature of Rights*, in *THE MORALITY OF FREEDOM* 165, 166 (1986); T.M.

Fairness is concerned with the distribution of burdens and benefits—“with how well each person’s claim is satisfied compared with how well other people’s [claims] are satisfied.”⁵⁶ Even absent irreparable injury, fairness looms large when the imposition of risk is at issue, because risk impositions pit the claims of those who impose the risks and stand to benefit from them against those who are exposed to and endangered by those risks. Treating people fairly generally requires us to align burden and benefit proportionally.

Serious, irreparable injuries pose special problems. When harms are fully repairable, as they were in *Vincent*, we can achieve efficiency *ex ante* and fairness *ex post*. Damaging the dock to save the ship is efficient—it minimizes the total property damage done by the storm. Requiring reparation after the fact is fair; the ship owner who benefits from saving the ship also bears the cost of its salvation. Matters are different when the harms suffered by one individual are serious, irreparable impairments of normal agency, or, especially, death. We know how to rebuild a dock so that it is as good as new, but we do not know how to restore the victims of crippling latex allergy or brown lung disease to good health and normal powers of physical agency. Fairness cannot be achieved after these risks have ripened into injury. It must be done *ex ante*, by ensuring that the terms on which the risks in question are imposed are justifiable to those on whom they are imposed. When the burdens of risk imposition are borne by some people in the form of serious, irreparable harm and the benefits of imposing those risks are reaped by others, the distinction between persons looms especially large.

The safety and feasibility standards address severe and irreparable physical harms—premature death, serious disability and devastating disease. The stringent precautions that they prescribe are justified in a point of view that takes persons and their essential interests—not populations and their overall welfare—as its fundamental object of concern.⁵⁷ Populations are not

SCANLON, *Rights, Goals and Fairness*, in *THE DIFFICULTY OF TOLERANCE: ESSAYS IN POLITICAL PHILOSOPHY* 26, 34 (2003); JUDITH THOMSON, *THE REALM OF RIGHTS* 22–24 (1990).

56. John Broome, *Fairness*, 91 *PROC. ARISTOTELIAN SOC’Y* 87, 95 (1990–91). See also Frick, *supra* note 46, at 185–86; Dov A. Waisman, *Reasonable Precaution for the Individual*, 88 *ST. JOHN’S L. REV.* 653, 659–61 (2014); Kenneth W. Simons, *Tort Negligence, Cost-Benefit Analysis, and Tradeoffs: A Closer Look at the Controversy*, 41 *LOY. L.A. L. REV.* 1171, 1208–14 (2008).

57. This implicates an entire position in political philosophy, one which holds that political institutions and practices must be justifiable to those they govern. See generally RAWLS, *supra* note 54. The view has been given further articulation in the writings of others. See, e.g., THOMAS NAGEL, *EQUALITY AND PARTIALITY* 22–32, 120–21 (1991); T.M. SCANLON, *Contractualism and Utilitarianism*, in *THE DIFFICULTY OF TOLERANCE: ESSAYS IN POLITICAL PHILOSOPHY* 124, 139–50 (2003). It now marches under the banner of “contractualism.” A number of writers have made important contributions extending this approach to problems of risk. See generally, e.g., Rahul Kumar, *Contractualism and the Roots of Responsibility*, in *THE NATURE OF MORAL RESPONSIBILITY: NEW ESSAYS* 251 (Randolph Clarke

persons writ large. A single person may rationally choose to bear some burden to achieve an end she values, but a plurality of distinct persons lack the unity necessary to make the imposition of significant harm on one person straightforwardly offset by the conferral of benefits on other people. Accidental injuries devastate the lives of some people while the activities responsible for those injuries benefit other people. The terms on which some suffer terrible harm at the hands of imposed risks and others profit from the imposition of those risks stand in need of justification. That justification cannot be given by pretending that a circumstance where some stand to be devastated while others stand to profit is identical to a circumstance where one person stands both to win and to lose.

The proper test of principles of risk imposition is not whether they maximize net benefit, but whether they are justifiable to those whose lives they govern. A “significant” risk of serious harm is most fully justified when those who are likely to suffer from the risks would be acting unreasonably if they were to object to the imposition of the risk. Reasonable principles of risk imposition protect the essential interests of those affected by the risks in question. Doing so may well conflict with promoting overall welfare.⁵⁸ The claims of those whose lives are at risk of accidental destruction and devastation at the hands of valuable activities may require that the rest of us accept standards of safety that require more than efficient precaution.

B. THE PRIORITY OF AVOIDING HARM

Harm has no special significance in cost-benefit analysis, and its avoidance has no special priority. Harm is just one possible cost in a calculus of cost and benefit, and costs and benefits are minuses and pluses on the same scale:

et al. eds., 2015) [hereinafter Kumar, *Contractualism*]; James Lenman, *Contractualism and Risk Imposition*, 7 *POL., PHIL. & ECON.* 99 (2008); Frick, *supra* note 46. There is vigorous debate over whether contractualism can adequately address the imposition of risks of serious harm and death. Elizabeth Ashford and Barbara Fried have argued that it cannot. See generally Elizabeth Ashford, *The Demandingness of Scanlon’s Contractualism*, 113 *ETHICS* 273 (2003); Barbara H. Fried, *Can Contractualism Save Us from Aggregation?*, 16 *J. ETHICS* 39 (2012). Aaron James, Johann Frick, Rahul Kumar, and Dov Waisman have argued that it can. See generally Aaron James, *Contractualism’s (Not So) Slippery Slope*, 18 *LEGAL THEORY* 263 (2012); Rahul Kumar, *Risking and Wronging*, 43 *PHIL. & PUB. AFF.* 27 (2015) [hereinafter Kumar, *Risking*]; Dov Waisman, *Equity and Feasibility Regulation*, 50 *U. RICH. L. REV.* 1263 (2016); Waisman, *supra* note 56. I believe that “ex ante contractualism” as developed by James, Frick, Kumar, and Waisman is a powerful framework for analyzing risk. I shall deploy an ex ante contractualist framework in this Article, but I shall not attempt to develop the philosophical side of ex ante contractualism’s approach to risk.

58. This is clearest in the case of relatively pure forms of utilitarianism. See RAWLS, *supra* note 54, at 23–24 (noting that under classical utilitarianism there is “no reason in principle why . . . the violation of the liberty of a few might not be made right by the greater good shared by many.”).

From an abstract perspective, there would seem to be little reason for harms and benefits to be treated differently. Decades of cost-benefit analyses suggest that the two categories are interchangeable: reducing by one dollar damage that would otherwise occur is equivalent to providing a dollar's worth of new goods or services.⁵⁹

This claim of symmetry is true to cost-benefit analysis but at odds with our ordinary intuitions and our law. In both morality and law, our obligations to avoid harming others are stronger than our obligations to benefit them. In law, the asymmetry of harm and benefit is vivid and pervasive. We can be compelled to refrain from battering our neighbors, but we cannot be compelled to either love or help them. Tort is robust whereas restitution is anemic. The Constitution contains a takings clause, but it does not contain a "givings" clause. Understanding just how pervasive the harm-benefit asymmetry is—and why the avoidance of harm has special priority—dispels the illusion that it is irrational to take more than cost-justified precaution.

Many examples of the harm-benefit asymmetry manifesting itself in our law might be given,⁶⁰ but the following should suffice:

Endangering and Rescuing. In the law of torts, there is a general duty not to impose unreasonable risks of physical harm on others. There is no parallel general "duty to act"—no general duty to prevent others from coming to harm, or to mitigate harm that others are in the process of suffering.⁶¹

59. Wendy T. Gordon, *Of Harms and Benefits: Torts, Restitution, and Intellectual Property*, 21 J. LEGAL STUD. 449, 451 (1992).

60. For example, if I pollute your water when working on my own property, I am likely to be liable in nuisance for the harm that I do. By contrast, if I purify your water in the course of purifying my own, my unjust enrichment claim is likely to fail. Businesses can normally "free ride" off of the positive externalities of other business without doing any legal wrong. A story, popular in property circles, about Disneyland and Disney World is illustrative. When Disney built Disneyland, it acquired just enough land for its theme park. The park conferred a major windfall on neighboring landowners and businesses. Lured by Disneyland, customers came from all over the world, and the value of neighboring land soared. Several decades later, when Disney built Disney World, it purchased much more land than it needed for its theme park. The strategy worked, but imperfectly. Disney kept more of the total value added by its theme park, but the park's positive externalities also expanded into a larger geographic area. See Richard A. Epstein, *A Conceptual Approach to Zoning: What's Wrong with Euclid*, 5 N.Y.U. ENVTL. L.J. 277, 289 (1996). "Rescue cases" afford another important example. In the course of performing a rescue a rescuer may inflict lesser harm to avoid greater harm, but people may not inflict harm merely in order to confer benefit. For perceptive discussion of this example see Seana Shiffrin, *Harm and Its Moral Significance*, 18 LEGAL THEORY 357, 363–65 (2012). See also, e.g., LEO KATZ, *ILL-GOTTEN GAINS: EVASION, BLACKMAIL, FRAUD AND KINDRED PUZZLES OF THE LAW* 197–203 (1996) (discussing interesting and related asymmetries in the rules of praise and blame).

61. "If A saw that B was about to be struck on the head by a flowerpot thrown from a tenth-story window, and A knew that B was unaware of the impending catastrophe and also knew that he could save B with a shout, yet he did nothing and as a result B was killed, still, A's inaction, though gratuitous (there

Tort and Restitution. The law of torts, the province of which is liability for harm done, is robust. The law of autonomous unjust enrichment—the province of which is liability for benefit conferred—is much smaller.⁶²

Fraud and Failure to Volunteer Information. We all have various obligations not to commit fraud—obligations not to manipulate other people by providing false information. We are not under a parallel obligation to step forward and affirmatively provide information to others.

Takings and Givings. In our public law there is a takings clause, but there is no “givings” clause. Yet, as Bell and Parchmovsky observe, “the efficiency rationale for takings compensation also dictates that the state properly measure the benefits of its actions. Just as the state’s failure to internalize the cost of takings creates fiscal illusion and inefficiency, the state’s failure to internalize the benefits of givings creates fiscal illusion and inefficiency.”⁶³

In economic terms, all of these examples involve differential treatment of negative and positive externalities. Imposing a risk on a stranger subjects her to a negative externality; rescuing a stranger in peril confers a positive externality upon her. The law of torts is largely about harms; harms are negative externalities. The law of restitution is about un-bargained-for benefits; benefits are positive externalities. When the government takes property to build a freeway, it creates a negative externality; when it builds a freeway and brings new customers to a mall, it creates a positive externality. Misinforming customers by disclosing false information to them is a negative externality; educating them by disclosing valuable information is a positive externality.

From an economic point of view, negative and positive externalities are pluses and minuses on the same scale. They are symmetrical. Presumptively, the law should care as much about promoting positive externalities as it does about correcting negative ones. Unsurprisingly, therefore, the harm-benefit asymmetry has attracted attention from legal economists. Explanations have been offered, but the depth and pervasiveness of the differential treatment of positive and negative externalities is simply not what one would expect if

was no risk or other nontrivial cost to A) and even reprehensible, would not be actionable.” *Stockberger v. United States*, 332 F.3d 479, 480 (7th Cir. 2003) (Posner, J.).

62. See, e.g., Scott Hershovitz, *Two Models of Tort (and Takings)*, 92 VA. L. REV. 1147, 1174–75 (2006); Saul Levmore, *Explaining Restitution*, 71 VA. L. REV. 65, 71 (1985) (“[T]he legal remedies available to victims of harms are far superior to those enjoyed by analogous providers of nonbargained benefits.”).

63. Abraham Bell & Gideon Parchomovsky, *Givings*, 111 YALE L.J. 547, 554 (2001).

efficiency were the master value of the law.⁶⁴ The plain fact is that “other things being equal, harms, harming events, and opportunities to harm are more important morally [and legally] than benefits, benefitting events, and opportunities to benefit.”⁶⁵

1. Caveats and Complexities

Examples of the harm-benefit asymmetry are knotty, and they can be misleading. Real-world examples present complex configurations of consideration; they do not simply instantiate the asymmetry in its pure form. Restitution cases, for example, raise the question of when people are obligated to pay for unsolicited benefits, not the question of when they are obligated to confer benefits on others. These are markedly different questions. Similarly, the distinction between negative and affirmative duties not only implicates the difference between harm and benefit, it also implicates the deep and difficult distinction between malfeasance and nonfeasance. Legal examples have distinctive institutional dimensions. They may, for instance, implicate the division of labor among institutions. Takings may be the proper concern of private rights of action, whereas “givings” may be addressed by the “public law” of taxation. Conversely, economic analysis may exaggerate the salience of the harm-benefit distinction by virtue of its restricted vision: economic analysis takes welfare to be the only relevant value and consequences to be the only morally significant phenomenon. The

64. See generally, e.g., Oren Bar-Gill & Ariel Porat, *Harm Benefit Interactions*, 16 AM. L. & ECON. REV. 86 (2013); Ariel Porat, *Private Production of Public Goods: Liability for Unrequested Benefits*, 108 MICH. L. REV. 189 (2009) (arguing that liability for unrequested benefits often enables production of public goods which would not otherwise be created). Levmore, *supra* note 62, at 67–68, is particularly focused on the comparatively feeble state of the law of unjust enrichment in comparison with the law of torts. The economic theory of property law has had significant success in arguing that property law responds to the problem of positive externalities. See, e.g., Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 348 (1967) (“A primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities.”). Economic explanations for other instances of the asymmetry have also been offered. See generally, e.g., William M. Landes & Richard A. Posner, *Salvors, Finders, Good Samaritans, and Other Rescuers: An Economic Study of Law and Altruism*, 7 J. LEGAL STUD. 83 (1978).

65. Shiffrin, *supra* note 60, at 361 (describing this as the “first [and] principal” harm-benefit asymmetry.) There are two subordinate asymmetries. First, lesser harm may be inflicted to avoid greater harm but harm may not be inflicted simply in order to bestow benefit. If you are drowning, I may break your arm to save your life. I may not, however, knock you unconscious in order to operate on you and endow you with encyclopedic knowledge of the works of Shakespeare, or the athletic prowess of Michael Jordan. Second, there is an asymmetry between what others may do and what a person may do to herself. Others may not knock someone out to perform an operation which will endow the victim with great knowledge or skill, but someone may themselves elect to submit to such a procedure. *Id.* at 363–66. Other complications or qualifications are sometimes necessary. For example, some failures to benefit are harms because the victim has a right to the benefit. If USC fails to pay my salary, its failure to benefit me is a harm because I have a right to be paid.

“givings” problem may not loom so large in a framework that places peoples’ rights and responsibilities at its center.

These caveats and complexities are real and important, but they should not lead us to lose sight of the forest for the trees. Our negative rights not to be harmed *are* more extensive than our positive rights to recover when we benefit others. The asymmetry of harm and benefit may not be the only reason why, but it is an important reason and a common thread unifying a range of important phenomena.

2. Autonomy and Asymmetry

For cost-benefit analysis, the harm-benefit asymmetry is a puzzle at best and irrational at worst. If avoiding a dollar’s worth of damage “is equivalent to providing a dollar’s worth of new goods or services,” then we ought to treat harms and benefits symmetrically.⁶⁶ However, if we take off the lenses of cost-benefit analysis, we can see the sense in the asymmetry. Harm is a morally freighted word. It is presumptively wrong to harm someone and presumptively bad to suffer harm. In most circumstances, it is not presumptively wrong to fail to benefit someone. Benefits are presumptively good things, but they are also often trivial good things, or good things we cannot put to good use. Harms impair essential conditions of human agency. Physical harms—death, disability, disease, and the like—rob us of normal and foundational powers of action. Physical harm comes close to being unconditionally bad.⁶⁷

By contrast, few benefits are unconditionally good. Benefits enhance lives, but their power to do so usually depends greatly on the details of the life in question. Extraordinary visual-spatial processing skills, for example, are of great value to football quarterbacks and of little use to lawyers. Unusually low levels of anxiety may be indispensable to elite mountaineers and an impediment to more ordinary lines of work. Whether some benefit—great wealth, great musical talent, great athletic skill, or mathematical brilliance—plays a valuable role in someone’s life depends heavily on her aspirations and projects. Even great wealth is not an unalloyed good. Great wealth is necessary to major philanthropy, but it may impair the pursuit of authentic relationships. The capacity of wealth and its pursuit to get in the way of pursuing valuable ends should not be underestimated. It is well

66. Gordon, *supra* note 59, at 451.

67. In some cases, the physical harm suffered may avoid a greater physical harm. In others, the harm may enable the realization of some value or good to whose realization the harmed person is deeply committed. These are exceptional cases, however, and even in these cases the harm suffered is still, in itself, bad. A broken arm may be worth suffering if it avoids death by drowning, but it is still a harm.

known that winning the lottery is anything but an unalloyed good.⁶⁸

Harms and benefits stand in very different relation to autonomy because they stand in very different relation to our wills. Harms compromise our autonomy by impairing our normal powers of human agency. Benefits enhance our lives only if they are congruent with our wills. To thrust an unsought benefit upon someone and demand compensation from them for the value conferred is to impose upon them.⁶⁹ Unsought benefits stand in the same relation to our wills as harms do. They subject us to conditions which we have not chosen; they sever the link between our wishes, our wills, and our lives and enlist us in other people's projects. If I play beautiful music outside your open bedroom window and then stick you with a bill for my services, I determine the use to which you must put some of your time and some of your money. You are presumptively entitled to determine those things, and your ability to do so is an important aspect of your autonomy.

The fact that both harms and obligations to benefit can undermine autonomy explains the asymmetry between our stringent obligation not to commit fraud and our permission not to volunteer useful information. Fraud is deception, and deception is wrong because it unjustifiably undermines autonomy. By manipulating the reasons available to those on whom it acts, fraud severs the link that normally exists between a person's reason and their will. Fraud makes its victims the unwitting instruments of its perpetrators' wills. A duty not to commit fraud is a duty not to undermine the autonomy of others in a particular and important way. By contrast, an obligation to volunteer information for the benefit of others, merely because it is beneficial to them, would be an imposition on our autonomy. We would be required to work for the benefit of others whether or not we chose to do so and whether or not we were compensated for doing so. A *general* obligation to volunteer information for the benefit of others would be a significant burden on our autonomy.

3. Interests and Impairment

The claims that harms impair autonomy—and that the conferral of benefits does not necessarily enhance autonomy—presuppose an account of harm and benefit. The concept of a benefit, for its part, is broad, straightforward, and relatively uncontroversial. A benefit is an advantage,

68. See, e.g., Philip Brickman et al., *Lottery Winners and Accident Victims: Is Happiness Relative?*, 36 J. PERSONALITY & SOC. PSYCHOL. 917, 926 (1978).

69. See, e.g., Lee Anne Fennell, *Forcings*, 114 COLUM. L. REV. 1297, 1300 (2014) (discussing forced ownership of property by the government).

which promotes or enhances well-being.⁷⁰ In contrast, the philosophical literature on harm is divided between dueling conceptions. The dominant conception conceives of harm as a setback to an “interest,” with an interest being something in which someone has a “genuine stake.”⁷¹ Harm so conceived is a comparative phenomenon, a worsening of one’s position. To be harmed is to have one’s well-being significantly diminished, either historically or counterfactually. One is either worse off than one was (the historical account), or one is worse off than one otherwise would have been (the counterfactual account). For example, a college football player with aspirations to a professional career is harmed historically if he is injured, loses his starting position to another player, and is subsequently cut from the team. He is harmed counterfactually if his professional aspirations are thwarted because he is never drafted.

A competing conception understands harms as any condition one would not desire to suffer because it impairs normal functioning.⁷² The focus is on the condition or state itself, not on its relation to an antecedent or alternative condition. Suffering excruciating pain, for example, is harm—even if the alternative is death and even if you prefer agonizing pain to death. Being enslaved is harm whether or not one was born free. Core harms in this conception are conditions of impairment, conditions which compromise normal functioning. For example, blindness, is a harm for a human being because sight is a part of normal human functioning. This is true even if the person in question is born blind and so never suffered the loss of sight—never underwent any worsening of position.

The concept of an “impaired condition” is broad. Anything that can function normally can have its proper functioning impaired. Damage to a butterfly’s wings disturbs the functioning of the wings and harms the

70. See Shiffrin, *supra* note 60, at 358.

71. JOEL FEINBERG, *SOCIAL PHILOSOPHY* 26 (1973) (“A humanly inflicted harm is conceived as the violation of one of a person’s interests, an injury to something in which he has a genuine stake.”). The idea of a setback can be developed either counterfactually or historically. Feinberg develops it counterfactually. See JOEL FEINBERG, *Wrongful Life and the Counterfactual Element in Harming*, in *FREEDOM AND FULFILLMENT* 3, 4 (1992). Hershovitz draws upon and modifies Feinberg’s account of harm. See Hershovitz, *supra* note 62, at 1161–67.

72. Preeminently, this conception is advanced by THOMSON, *supra* note 55, at 262–68, and by Shiffrin, *supra* note 60, at 383. See also generally Judith Jarvis Thomson, *More on the Metaphysics of Harm*, 82 *PHIL. & PHENOMENOLOGICAL RES.* 436 (2011). In *The Metaphysics of Harm*, Hanser develops a third conception of harm. That conception takes harms to be events that injure basic human goods, not the ensuing conditions of impairment. Basic goods are “those [goods] the possession of which makes possible the achievement of a wide variety of the potential components of a reasonably happy life. . . . [B]asic goods . . . include certain fairly general physical and mental powers or abilities. The power of sight, for example, is a basic good for human beings.” Matthew Hanser, *The Metaphysics of Harm*, 77 *PHIL. & PHENOMENOLOGICAL RES.* 421, 440–41 (2008).

butterfly. Harm in this broad sense need not impair autonomy; many things that are not autonomous have functions that can be impaired. The core cases that concern law and morality—cases such as physical disabilities, broken, deformed and lost limbs, chronic pain, and serious developmental disabilities—constitute a narrower set of impaired conditions. In these core cases, *basic powers of normal human agency are seriously compromised*. The harms that matter most in law and morality rob people of normal and essential powers through which they shape their lives and their worlds in accordance with their wills.⁷³ The will looms large here because it is at the center of our understanding and experience of ourselves as agents. We draw upon our wills when we act. The exercise of our wills makes us aware that we are beings who can bring possibilities into existence by choosing to do so. For example, I can bring words into existence on a page by typing on a keyboard. Physical harms, chronic pain, and developmental disabilities deprive us of normal forms of mastery over ourselves, our experience, and some portions of the external world by driving a wedge between our wills and our lives. Pain, for instance, can thwart my control over my experience of the world. These harms thrust upon us “conditions that generate a significant chasm” between our wills and our experiences.⁷⁴

4. The Importance of Impairment

Both the interest and the impaired condition accounts can be mapped onto American law, but the “impaired condition” conception of harm fits the law of torts more precisely. Tort law distinguishes between a broad conception of tortious wrongdoing as conduct that invades “legally protected interests” (or rights), and a narrower conception of physical harm as the suffering of an impaired condition.⁷⁵ For example, the first *Restatement of Torts* defined bodily harm as “any impairment of the physical condition of another’s body or physical pain or illness.”⁷⁶ The second *Restatement* refined this conception. “Bodily harm” was defined as “any physical impairment of the condition of another’s body” and “an impairment of the physical condition of another’s body [exists] if the structure or function of any part of

73. See Shiffrin, *supra* note 60, at 383. In sharpening the concept of harm in this way Shiffrin is, in part, criticizing Raz’s conception as too broad. See *id.* at 389 n.48. By contrast, she is further articulating Thomson’s conception, though Thomson might not accept the sharpening. See, e.g., THOMSON, *supra* note 55, at 227–48, 250–51, 253–71; Thomson, *supra* note 72, at 439, 443 (defending the thesis that harm identifies a state or condition that it is non-comparatively bad to be in).

74. Seana Shiffrin, *Wrongful Life, Procreative Responsibility, and the Significance of Harm*, 5 LEGAL THEORY 117, 123 (1999).

75. See, e.g., RESTATEMENT (SECOND) OF TORTS §§ 7, 15 (AM. LAW INST. 1965).

76. RESTATEMENT (FIRST) OF TORTS § 15 (AM. LAW INST. 1934).

the other's body is altered."⁷⁷ The third *Restatement* now defines "physical harm" as "the physical impairment of the human body ('bodily harm') or of real property or tangible personal property . . . [such impairment] includes physical injury, illness, disease, impairment of bodily function, and death."⁷⁸

Broken bones, severed limbs, disabilities of sight and hearing, diseased organs, and disfigured body parts all compromise the normal capacities through which we exert our wills. These capacities play central roles in normal human lives. We are denied our normal lives when we are seriously ill, disabled, or in serious. This is explicitly recognized in statutes and cases. Michigan's codification of the standard common law rule in the automobile accident context, for example, defines "serious impairment of bodily function" to mean "an objectively manifested impairment of an important body function that affects the person's general ability to lead his or her normal life."⁷⁹ A body of case law grappling with the slowly unfolding consequences of exposure to asbestos overwhelmingly holds that identifiable subclinical damage to human cells will not support a tort claim.⁸⁰ "The threat of future harm, not yet realized, is not enough."⁸¹ Functional impairment must be shown.⁸² Without such impairment there is no physical harm even

77. RESTATEMENT (SECOND) OF TORTS § 15 cmt. a. Section 7 distinguishes "bodily harm" from "injury," with "injury" covering cases in which a "legally protected interest" is invaded, but no harm is done. A harmless trespass would be an injury in this sense. *Id.* § 7.

78. RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM § 4 (AM. LAW INST. 2010). The RESTATEMENT (THIRD) extends the idea of harm as an impaired condition to include the impairment of property. The philosophical conception of harm is concerned only with harm to persons. The question of how to account for the importance of property damage to tort is peripheral to the concerns of this Article. Offhand, the easiest way to make the extension would appear to be to draw upon the fact that we have rights in property. Those rights give rise to claims against others that they not damage our property, and make impairment of our property a harm to us.

79. MICH. COMP. LAWS. § 500.3135(5) (2017). "A person remains subject to tort liability for noneconomic loss caused by his or her ownership, maintenance, or use of a motor vehicle only if the injured person has suffered death, serious impairment of body function, or permanent serious disfigurement." *Id.* § 500.3135(1). A recent Michigan Supreme Court case, *McCormick v. Carrier*, 795 N.W.2d 517, 521–23 (Mich. 2010), applied this concept of impairment in an instructive manner. Plaintiff's foot was broken and bruised when defendant's truck ran it over. The foot healed, though it continued to ache occasionally. With the healed foot the plaintiff could perform the same work he performed prior to the injury but the post-injury foot hampered his fishing and other recreational activities. The court found impairment because plaintiff's ability to lead his normal life was adversely affected.

80. Pleural thickening, a condition in which the lining of the lung thickens, may be the most common form of cellular damage which does not, by itself, count as physical harm. Because the harms of asbestos exposure are progressive, pleural thickening is a harbinger of asbestosis and mesothelioma. See D.T.D. Hughes, *Lung Disease Related to Exposure to Asbestos*, 14 MED. SCI. & L. 147, 148–49 (1974).

81. *Burns v. Jaquays Mining Corp.*, 752 P.2d 28, 30 (Ariz. Ct. App. 1987) (quoting PROSSER & KEETON ON THE LAW OF TORTS § 30 (W. Page Keeton ed., 5th ed. 1984)).

82. *Id. Accord In re Haw. Fed. Asbestos Cases*, 734 F. Supp. 1563, 1567 (D. Haw. 1990); Owens-

though there are very real financial and psychological costs imposed by subclinical cellular damage caused by exposure to asbestos.⁸³

Because physical capacities play central roles in normal human lives, physical harm is the central case of harm under the impaired-condition conception.⁸⁴ Blindness is, for example, serious harm because sight is a normal human capacity, and its loss usually diminishes a person's life. Being blind denies someone access to an important range of normal human activities. Other things being equal, a person whose sight is normal has access to a richer life than a blind person does. A broken leg is a serious harm because a person whose leg is broken is unable to engage in a range of normal activities, beginning with walking. A loss of a leg is a more serious harm than a broken leg, because the loss of a leg is permanent whereas a broken leg, properly treated, will heal.⁸⁵ On an impaired-condition conception, then, the gravity of harm is usually a function of the importance to the victim's life of the capacity that the harm impairs and the duration of the impairment.

Physical impairments are almost always bad for those who suffer them, but not all harms are equally grave. A gangrenous limb, for example, is both a serious impairment in itself and a threat to the life of the person whose limb it is. Losing a gangrenous limb is also bad, even though the person whose

Illinois, Inc. v. Armstrong, 591 A.2d 544, 560–61 (Md. Ct. Spec. App. 1991), *rev'd in part on other grounds*, 604 A.2d 47 (Md. 1992). *Contra Verbyrke v. Owens-Corning Fiberglas Corp.*, 616 N.E.2d 1162 (Ohio Ct. App. 1992), *abrogated by Ackison v. Anchor Packing Co.*, 897 N.E.2d 1118, 1124–25 (Ohio 2008) (the lower court holding that pleural thickening constitutes bodily harm).

83. Medical monitoring costs, for example, are very likely to be incurred if a patient presents with subclinical damage from asbestos. The psychic costs are even larger. Persons afflicted by such changes live under “sword[s] of Damocles” that are beginning to drop. This is a real and serious psychic burden, as the Supreme Court has noted. *Norfolk & W. Ry. Co. v. Ayers*, 538 U.S. 135, 150 (2003) (quoting *Alley v. Charlotte Pipe & Foundry Co.*, 74 S.E. 885, 886 (N.C. 1912)) (“In the course of the 20th century, courts sustained a variety of other ‘fear-of’ claims. Among them have been claims for fear of cancer. Heightened vulnerability to cancer . . . must necessarily have a most depressing effect upon the injured person. Like the sword of Damocles, he knows it is there, but not whether or when it will fall.”).

84. ERVING GOFFMAN, *STIGMA: NOTES ON THE MANAGEMENT OF SPOILED IDENTITY* 41–104 (1963). Psychological harm follows not far behind. Impaired psychological capacities wreak similar havoc with normal lives. Child sexual abuse, for instance, usually leads to serious harm because it usually damages the capacity to trust other people and so impairs the formation of normal and valuable human relationships. Disfigurement is, intuitively, a core case of harm, but not an easy case to explain. The role of normal human appearance in social relations probably explains the importance of disfigurement as a harm. *See id.* at 51–53.

85. In *Davis v. Consolidated Rail Corp.*, 788 F.2d 1260, 1263 (7th Cir. 1986), Judge Posner remarks that “the loss of a leg is a terrible disfigurement, especially for a young man,” even if the victim “is able to walk with the aid of prosthetic devices, to drive, to work, and in short to lead almost a normal life.” The plaintiff had had one leg severed just below the knee and most of the foot on the other leg sliced off in a railroading accident. *Id.* at 1262. Precisely because the idea of harm as impairment is not a part of the economic theory to which Judge Posner subscribes, this appeal to ideas of disability and disfigurement is revealing.

limb is lopped off is better off than he would be if it were left attached. To live without a limb is to live with seriously diminished capacities of agency. On the impairment account, lesser harms are still harms. From the point of view of the interest account of harm, by contrast, lesser harms are not harms. They are benefits. The person whose gangrenous limb is lopped off is better off than she would have been had the limb been left in place. Severing her limb improves her position. And, economically speaking, lopping off the limb is a Pareto-superior move. Amputation is preferable to keeping the limb and letting the gangrene spread. Both of these observations are correct on their own terms. But the terms are deeply misleading. It is not a benefit to live without a limb. Loss of a limb is both disabling and disfiguring. We are in the domain of impairment, not the domain of improvement.

When harm is conceived of as an impaired condition—and physical impairment is considered the core case—harm delineates a comparatively narrow domain of special concern. Harm so conceived is much narrower than cost. Cost is any value given up in order to obtain some good. It encompasses any disadvantage, anything which diminishes well-being. Ordinary losses—athletic, financial, and romantic—are costs, but not harms.⁸⁶ Ordinary losses make their victims worse off than they would otherwise be, but they do not leave their victims with permanent physical or psychological damage. The prospect of loss to others does not usually give rise to strong reasons to avoid inflicting such loss. The prospect of harm does. A person is, after all, at liberty to beat a competitor out for a job by being better qualified, but she is not at liberty to break that competitor's arm. In competitive circumstances, risk of loss is usually inseparable from the good that the competition seeks

86. Influential psychological research by Daniel Kahneman and others has shown that people's ordinary judgments about gains and losses violate the prescriptions of expected utility theory because people treat financial losses and gains differently. See generally Daniel Kahneman et al., *Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias*, 5 J. ECON. PERSP. 193 (1991). People regard losing a sum of money as involving more disutility than failing to acquire an equivalent sum. See *id.* at 194, 199–203. The implication of this research is that people are stubbornly irrational. Sometimes, people's irrational aversion to loss is used to justify standards of precaution which require more than efficient precaution. See David A. Dana, *A Behavioral Economic Defense of the Precautionary Principle*, 97 NW. U. L. REV. 1315, 1324–26 (2003). There is an obvious resemblance between the asymmetry of harm and benefit and the asymmetry of gain and loss, but it is a mistake to conflate the two. Harms result in impaired conditions whereas losses generally do not. Harms are qualitatively different from benefits; losses are not qualitatively different from gains. Moreover, insofar as the psychological research implies that people make irrational judgments, that conclusion runs contrary to the argument developed here that people have good reason to treat harms and benefits differently. Those reasons are rooted in considerations having to do with autonomy, not expected utility. Last, the aim of Kahneman's research is to identify and understand the operation of various cognitive processes. The aim of this Article is to show that we have good legal and moral reasons to treat harms and benefits differently. Good reasons and psychological propensities are very different matters. Psychology can no more establish what we have good reason to believe than philosophy can determine how ordinary processes of cognition operate.

to realize. Races that cannot be lost are not worth winning, and markets in which firms cannot fail do not realize the benefits of economic competition. And, in sports, business and love, the risk of loss is accepted when the enterprise is taken up. Losses suffered in these arenas cannot usually be counted as harms. This is so even though it is not always worse to suffer harm than loss. Most of us would rather, for instance, break our pinkies than see our business bankrupted by a competitor. The point is that it is presumptively wrong to do harm, whereas it is not presumptively wrong to inflict loss. It is not presumptively wrong for one businessman to drive another out of business, fair and square, but it is presumptively wrong for one businessman to break another's finger. Absent some further condition—such as a right to, or a legitimate expectation of, some benefit—losses are not harms.⁸⁷

In short, harm's special significance is a consequence of its intimate connection to autonomy. There is nothing special about harm from an efficiency perspective; harms are simply one kind of cost. Yet harm does have special significance in our ordinary moral thinking and in our law. To understand harm's special significance, we need to step outside the framework of cost-benefit analysis and adopt a framework that takes our separateness and independence as persons as fundamental, and which understands us as agents who have a fundamental interest in authoring our own lives. Harm has special significance because harms compromise our autonomy by impairing our normal powers of human agency. Benefits, for their part, do not stand in the same relation to autonomy. Benefits enhance our lives only if they are congruent with our commitments. Unsought benefits imposed upon us diminish our autonomy by enlisting us in other people's projects.

5. Tying the Threads Together

The harm-benefit asymmetry manifests itself in differences in the stringency of our obligations. Our obligations not to harm others are more demanding than our obligations to benefit others. The safety and feasibility norms address a different problem, namely, the problem of how to trade safety off against other goods. The measure of their success is whether they register the disproportionate importance of avoiding harm in a persuasive way. To begin to answer that question we need to connect the priority of avoiding harm with the separateness of persons, and ask when benefits to some might justify imposing risks of harm on others. When we consider

87. See Fennell, *supra* note 69, at 1361, 1363–65 and accompanying text.

significant risks of serious harm, fairness forbids the unrestricted aggregation that is the hallmark of cost-benefit analysis. What it requires is that we compare the benefits of those who stand to gain to the burdens imposed on those who stand to lose.⁸⁸ Some gains—some benefits—are not comparable to serious harms. When serious harm is risked, something of comparable importance must sit on the benefit side of the scale. An example of T.M. Scanlon's brings this out.⁸⁹ Scanlon supposes that a piece of transmitting equipment has toppled and pinned a television technician, who was helping to broadcast a live sporting event to which millions of viewers remain glued. The technician is in agonizing pain. The only way to save the technician's life is to interrupt the broadcast for fifteen minutes. The game will not be over for another hour. Unrestricted cost-benefit analysis holds that, if enough people stand to be disappointed by the termination of a television show, terminating the life of a television technician may be preferable to terminating the broadcast of the show. The net benefit to all of the viewers (measured by what they would be willing to pay to have the broadcast continue) might easily exceed the net loss to the technician (measured by what he would be willing to pay to have the transmission interrupted).

Our moral sensibility balks at the conclusion that net social benefit is dispositive in this case. We take the distinction between persons seriously. Taking that distinction seriously brings issues of interpersonal fairness to the fore. Although the number of viewers may be vast, the harm to them is not morally comparable to the harm that the technician stands to suffer. No amount of inconvenience and disappointment distributed across a population of distinct persons sums to the moral equivalent of subjecting someone to unendurable pain. Consequently, we should not decide how to proceed by measuring the victim's preference for having her agony alleviated in dollars and then comparing that sum to the price that the viewers would pay to have the broadcast continue. The cost to the technician and the benefit to the viewers are not substitutable at some ratio of exchange. The benefit to the viewers is, comparatively speaking, trivial, and the harm to the technician is devastating. Aggregating harms and benefits does not make moral sense when the harms and benefits are not comparable.

88. This involves evaluating risk impositions from representative "standpoints" and considering the "generic reasons" relevant to those standpoints. Kumar, *Risking*, *supra* note 57, at 41. *See also* Kumar, *Contractualism*, *supra* note 57, at 256–57. The presumptively relevant standpoints are the standpoints of potential injurers and victims. Often these standpoints must be revised and refined to analyze a particular circumstance well.

89. *See* SCANLON, *supra* note 13, at 235.

Taking the distinction between persons and the priority of avoiding harm seriously, and situating them within the larger philosophical framework where they are at home, puts us in a position to understand the logic at work in the safety and feasibility norms. Health and physical integrity are kinds of primary goods. Values, for their part, are plural and incommensurable. The point of protecting the essential conditions of agency for each person is to enable people to shape their own lives in accordance with their aspirations. Within a framework that prioritizes the protection of each person's essential interests, the question of how to trade health or safety off against other goods requires making judgments of urgency (or need), not preference (or want).⁹⁰ Health and safety should only be sacrificed in order to promote some even more urgent interest. The safety and feasibility norms are ways of articulating the priority of avoiding harm and they embody judgments of comparable value—judgments about just what goods are important enough to justify imposing significant risk of irreparable and serious harm.

III. COST-JUSTIFIED, FEASIBLE, AND SAFE PRECAUTION

As we have seen, the “feasibility” and “safe level” standards of acceptable risk imposition are well defined and usefully understood in relation to the standard of cost-justified precaution.⁹¹ The three standards identify distinct levels of permissible risk imposition. Normally, they stand in linear, vertical relation to one another.⁹²

Cost-justified risk reduction. Among these three standards, the cost-justification standard tolerates the most risk. Cost-benefit analysis treats all costs and benefits as fungible at some ratio of exchange and holds that they should be traded off in a way which maximizes net benefit. In the context of

90. See generally T.M. SCANLON, *Preference and Urgency*, in THE DIFFICULTY OF TOLERANCE: ESSAYS IN POLITICAL PHILOSOPHY 70 (2003).

91. My discussion here leans backwards a bit, in the sense that it places primary weight on somewhat older cases. There are two reasons for doing so. First, the earlier cases are foundational and in that way more important. Second, recent cases exhibit something of a tendency to reinterpret these standards through the lens of cost-benefit analysis. That tendency obscures the differences among the standards. Others, especially, David Driesen, have interpreted these standards differently. See generally David M. Driesen, *Distributing the Costs of Environmental, Health, and Safety Protection: The Feasibility Principle, Cost-Benefit Analysis, and Regulatory Reform*, 32 B.C. ENVTL. AFF. L. REV. 1 (2005). See also Waisman, *supra* note 57, at 1275–89 (discussing this disagreement and a qualified endorsement of the view I take here).

92. As noted *supra* in Part I, however, it is debatable whether this relation is necessary. For a discussion of circumstances where it is arguably not cost-justified to engage in an activity in the first place and where the activity is also governed by feasibility analysis, see *supra* note 16 and accompanying text.

accidental physical harm, the method usually focuses, more narrowly, on the costs and benefits of paying for and preventing accidents. Minimizing those combined costs maximizes the benefits extracted from the risky activities at issue. Cost-benefit analysis thus requires risks to be reduced to the point where the costs of further precaution exceed the benefit. If the marginal costs of eliminating significant risks exceed the marginal benefits, significant risks will continue to exist.

Feasible risk reduction. The feasibility standard tolerates less risk. Feasibility analysis looks to achieve the lowest level of risk practically attainable, not the level of risk that minimizes the combined costs of injuries and their prevention. Feasibility analysis requires the elimination of “significant” risks, when they can be eliminated without threatening the long-run health of the activity to which the risks belong. Significant risks remain only if their elimination would threaten the survival of the activity.

Safe level of risk imposition. The safe-level standard tolerates the least risk. Safety-based regulations require risk to be reduced to a point where no “significant risk” of devastating injury remains. Applying the safe-level standard therefore does not require any inquiry into the costs of risk reduction. All that it requires is a determination of the level at which the risk created by exposure to the regulated substance ceases to be significant.

The two standards of most interest to us—the safety and feasibility standards—employ a relatively well integrated set of concepts, and have their characteristic domains of application. The feasibility standard, for its part, is further broken down into technological and economic prongs. The legal regimes that the standards establish need to be understood in terms of these concepts. The regimes themselves need to be understood in relation to one another, in relation to the idea of cost-justified risk reduction, and in light of their usual domains of application.

A. THE “SAFE” LEVEL OF RISK IMPOSITION

The safe-level approach is adopted in some aspects of clean air, clean water, and pure food legislation, particularly regulation of toxic substances that may endanger public health. The Food Quality Protection Act of 1996 is one case in point.⁹³ Clean air statutes also incorporate safety-based

93. Food Quality Protection Act of 1996, Pub. L. No. 104-170, sec. 405, § 408(b)(2)(A)(ii), 110 Stat. 1489, 1516 (codified as amended at 21 U.S.C. § 346a (2012)) (requiring reduction of pesticide residue on foods to a “safe” level, where “safe” means there is “reasonable certainty that no harm will result”).

regulation.⁹⁴ A provision of the Clean Air Act,⁹⁵ for example, focuses on cancer risks remaining after technology-based regulations for hazardous pollutants have been in effect for six years.⁹⁶ If a numerically defined level of cancer risk has not been achieved at that point, the EPA is directed to issue additional regulations that will “provide an ample margin of safety to protect public health.”⁹⁷ The regulatory aim behind these provisions is to “reduce lifetime excess cancer risks to the individual most exposed to emissions . . . to less than one in one million.”⁹⁸ Some residual risk thus survives safe-level regulation. Requiring that “lifetime excess cancer risks to the individual most exposed to emissions” be reduced “to less than one in one million” expresses a judgment of significance. A lifetime risk of cancer (from a regulated emission) that crosses the “one in one million” threshold crosses from the domain of insignificant risk into the domain of significant risk.⁹⁹

The emphasis on protecting either those “most exposed” to risk or those most susceptible to it is a recurring theme in safety-based regulation. Clean water regulation supplies a closely related example: the court in *Hercules, Inc. v. EPA* insisted on especially stringent precautions against possible harm from toxins, even though the chance of that harm materializing could not be

94. See *Union Elec. Co. v. EPA*, 427 U.S. 246, 258 (1976) (stating that the Clean Air Act’s three-year deadline purposely “leaves no room for claims of technological or economic infeasibility.”).

95. Act to Amend the Clean Air Act, Pub. L. No. 101-549, 104 Stat. 2399 (codified as amended at 42 U.S.C. §§ 7401–7671).

96. 42 U.S.C. § 7412(f)(1).

97. *Id.* § 7412(f)(2)(A).

98. *Id.*

99. See *id.* In their important 2014 paper, Michael Livermore and Richard Revesz argue that this kind of regulation (which they call “health-based”) is fatally afflicted by two problems: the “stopping-point problem” and the “inadequacy paradox.” Livermore & Revesz, *supra* note 11, at 1186, 1188. The “stopping-point problem” is that “when costs cannot be considered, it is difficult to justify any stopping point other than zero.” *Id.* at 1187. The “inadequacy paradox” is that health-based regulation has not led to more stringent regulatory standards. This latter claim is meant to challenge the consensus of all the parties to the decision in *Whitman v. American Trucking Ass’ns*, 531 U.S. 457 (2001). This Article takes no position on the “inadequacy paradox.” It does, however, offer an interpretation of safety-based regulation which is not subject to the stopping-point problem. As the text explains, safety-based regulation stops when the remaining risk is insignificant. One cannot help but wonder if the “stopping-point problem,” as Revesz and Livermore conceive it, is at least in part an artifact of their own commitment to think in terms of maximizing value. To maximize value, you must pursue benefit up to the point where further pursuit no longer increases value. If you can never consider cost—and if risk reduction is always beneficial—maximizing value requires reducing risk until there is no risk at all remaining, and that is either impossible or undesirable. The logic here is compelling only if you accept value-maximization as an ideal. This Article argues that safety-based regulation finds its justification in an alternative, non-maximizing framework. Within that framework, “insignificance” makes sense as a stopping point, and the pressure to reduce risk indefinitely does not exist.

estimated.¹⁰⁰ The 1972 amendments to the Federal Water Pollution Control Act¹⁰¹ authorized health-based regulation of toxic effluents without consideration of “feasibility, achievability, practicability, economic impact, or cost,” and addressed standards for determining permissible discharge levels for such toxins.¹⁰² EPA discharge standards, the court ruled, must provide an “ample margin of safety” and “protect against incompletely understood dangers to public health and the environment, in addition to well-known risks.”¹⁰³

B. FEASIBLE RISK REDUCTION

Clean air and water regulation also makes use of the feasibility standard. The Clean Air Act, as amended in 1990, for example, provides that regulatory standards for hazardous air pollutants “shall require the maximum degree of reduction in emissions” that the EPA, “taking into consideration the cost of achieving such emission reduction,” determines to be “achievable.”¹⁰⁴ Feasibility is also the touchstone of the Occupational Safety and Health Act of 1970,¹⁰⁵ which created the Occupational Safety and Health Administration (“OSHA”), and it is in this context that it has received its most extensive application and judicial interpretation. As articulated by OSHA and the courts, the feasibility norm has acquired a specialized technical meaning. Nonetheless, it helps to recognize that this specialized legal meaning is analogous with the ordinary meaning of the word. In ordinary usage “feasible” means, roughly, “achievable.” In the remark quoted at the beginning of this Article, Paul Krugman used “feasible” to make the point that liberals do not need to claim that universal health insurance maximizes wealth or welfare, just that it is possible to provide universal health insurance and still have a healthy economy.¹⁰⁶

Feasibility analysis, as practiced by OSHA, is governed by the same basic thought. Feasible risk regulation is risk regulation that does not destroy the valuable activity whose risks it seeks to reduce. That said, feasibility-based regulation has a more complex structure than safety-based regulation. Feasibility analysis requires the identification of “a significant [workplace]

100. *Hercules, Inc. v. EPA*, 598 F.2d 91, 103–04, 112–14 (D.C. Cir. 1978).

101. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 86 Stat. 816 (1972) (codified as amended at 33 U.S.C. §§ 1251–1376).

102. *Hercules*, 598 F.2d at 111.

103. *Id.* at 104.

104. 42 U.S.C. § 7412(d)(2).

105. Occupational Safety and Health Act of 1970, Pub. L. No. 91-596, 84 Stat. 1590 (codified as amended at 29 U.S.C. §§ 651–678).

106. Krugman, *supra* note 1.

health risk,”¹⁰⁷ and an analysis of the feasibility of reducing that risk without crippling the activity that imposes the risk.¹⁰⁸ The cause of keeping ourselves oriented as we work our way through this thicket of legal regimes is best served by postponing detailed analysis of “significance” and first fleshing out the basic logic of “feasible risk reduction.”

1. The Two Faces of Feasibility

The determination of whether it is feasible to reduce a risk without crippling the activity that imposes it has two aspects—a “technological” one and an “economic” one. Technological feasibility analysis asks how much we could reduce this risk if we single-mindedly set out to reduce it as much as possible.¹⁰⁹ Economic feasibility analysis asks what is the lowest level of risk that the risk-imposing activity can afford to achieve.¹¹⁰ The aim of feasibility analysis is to protect “worker health and safety within the limits of economic possibility.”¹¹¹ “Congress itself defined the basic relationship between costs and benefits [when it enacted the Occupational Safety and Health Act of 1970 with its feasibility standard], by placing the ‘benefit’ of worker health above all other considerations save those making attainment of this ‘benefit’ unachievable.”¹¹² Feasibility analysis looks to achieve the lowest level of risk practically attainable.

2. Technological Feasibility

The technological side of feasibility analysis asks, as matter of engineering technique, what the lowest level of risk achievable by a continuing activity is. Any limit set on risk—a “permissible exposure limit” (“PEL”) for a toxic substance, for example—must be technologically

107. *Indus. Union Dep’t, AFL-CIO v. Am. Petroleum Inst.*, 448 U.S. 607, 615 (1980). The Court noted the importance of this threshold inquiry: “We agree with the Fifth Circuit’s holding that § 3(8) requires the Secretary to find, as a threshold matter, that the toxic substance in question poses a significant health risk in the workplace and that a new, lower standard is therefore ‘reasonably necessary or appropriate to provide safe or healthful employment and places of employment.’ Unless and until such a finding is made, it is not necessary to address the further question whether the Court of Appeals correctly held that there must be a reasonable correlation between costs and benefits, or whether, as the federal parties argue, the Secretary is then required by § 6(b)(5) to promulgate a standard that goes as far as technologically and economically possible to eliminate the risk.” *Id.* at 614–15. The toxin in question was benzene. *Id.* at 615.

108. *See id.* at 639–40.

109. *See KEETON ET AL.*, *supra* note 42, at 1238–39, 1252–53 (discussing the technological feasibility prong of feasibility analysis).

110. *See id.* at 1253–55 (discussing the economic feasibility prong).

111. *United Steelworkers of Am., AFL-CIO-CLC v. Marshall*, 647 F.2d 1189, 1263 n.102 (D.C. Cir. 1980).

112. *Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 509 (1981). *American Textile* involved occupational exposure to cotton dust, which causes brown-lung disease. *Id.* at 490–91.

attainable.¹¹³ Technological achievability, however, is not fixed by the outer limit of technological possibility at a given moment in time, because the most advanced techniques of risk control in place at a given moment in time may fall short of the frontier of what might be achieved. The frontier of technological feasibility is fixed by the engineering practice that might be achieved through a dogged commitment to feasible risk reduction. A regulatory agency promulgating a feasibility-based risk regulation may therefore specify an acceptable level of risk that is lower than the level attainable through the application of existing techniques, if the agency can reasonably predict that technical capability will advance sufficiently to make a lower level of risk imposition attainable within the time frame of the regulation.

In *American Iron & Steel Institute v. Occupational Safety & Health Administration*, for example, OSHA's standard for coke oven emissions was upheld as technologically feasible even though "the most modern and clean coke oven battery operating" met the standard only one-third of the time.¹¹⁴ Evidence of one-third compliance using less than all suitable technology—plus dramatic progress toward compliance at another plant after new engineering controls were implemented—showed sufficiently that the standard was not "impossible of attainment."¹¹⁵ The question was not what could be done at the moment, but "what the industry could achieve in an effort to best protect its . . . employees," given a determination to exploit "technological potentialities."¹¹⁶ The court therefore approved OSHA's reliance on "innovative technology currently in the experimental stage,"¹¹⁷ and its faith in new techniques "looming over the horizon."¹¹⁸

In *United Steelworkers of America, AFL-CIO-CLC v. Marshall*, Judge J. Skelly Wright gave the following summary of the concept of "technological feasibility":

The oft-stated view of technological feasibility under the [Occupational Safety and Health] Act is that Congress meant the statute to be "technology-forcing." This view means, at the very least, that OSHA can impose a standard which only the most technologically advanced plants in an industry have been able to achieve even if only in some of their

113. *Id.* at 500, 503.

114. *Am. Iron & Steel Inst. v. Occupational Safety & Health Admin.*, 577 F.2d 825, 832 (3d Cir. 1978).

115. *Id.* at 834 (quoting *Soc'y of Plastics Indus. v. Occupational Safety & Health Admin.*, 509 F.2d 1301, 1309 (2d Cir. 1975)).

116. *Id.* at 833–34.

117. *Id.* at 835.

118. *Id.* at 833.

operations some of the time. But under this view OSHA can also force industry to develop and diffuse new technology. At least where the agency gives industry a reasonable time to develop new technology, OSHA is not bound to the technological status quo. So long as it presents substantial evidence that companies acting vigorously and in good faith can develop the technology, OSHA can require industry to meet [Permissible Exposure Levels] never attained anywhere. . . .

As for [proof of] technological feasibility, we know that we cannot require of OSHA anything like certainty. Since ‘technology-forcing’ assumes the agency will make highly speculative projections about future technology, a standard is obviously not infeasible solely because OSHA has no hard evidence to show that the standard has been met. . . . OSHA’s duty is to show that modern technology has at least conceived some industrial strategies or devices which are likely to be capable of meeting the PEL and which the industries are generally capable of adopting.

Our view finds support in the statutory requirement that OSHA act according to the “best *available* evidence.” OSHA cannot let workers suffer while it awaits the Godot of scientific certainty.¹¹⁹

The requirement of technological feasibility is, thus, stringent. The technological side of feasibility analysis determines the presumptively appropriate level of precaution by reference to the best that *might* be done, given an unstinting commitment to the goal of feasible risk reduction—not by reference to what is customarily done, nor even by reference to the best that is now done.

3. Economic Feasibility

In *Portland Cement Association v. Ruckelshaus*, the court interpreted language in the Clean Air Act of 1970 requiring “a standard for emissions of air pollutants which reflects the degree of emission limitation achievable . . . taking into account the cost of achieving such reduction.”¹²⁰ It held that this language did *not* direct the EPA to undertake “a quantified cost-benefit analysis” in order to justify its air pollution standard for new or modified cement plants.¹²¹ The EPA’s conclusion that the cement industry could absorb the cost of control devices without detriment to competition between cement and substitute products, even though some plants might have to close, sufficed to answer the “essential question” under the Act: “whether the mandated standards can be met by a particular industry for which they

119. *United Steelworkers of Am., AFL-CIO-CLC v. Marshall*, 647 F.2d 1189, 1264–66 (D.C. Cir. 1980) (emphasis added) (citations omitted).

120. *Portland Cement Ass’n v. Ruckelshaus*, 486 F.2d 375, 378 (D.C. Cir. 1973) (citation omitted).

121. *Id.* at 387.

are set.”¹²² Judgments of economic feasibility require “tak[ing] into account the costs,” but they do not require “cost-benefit analysis.”¹²³ Indeed, insofar as the criterion of cost-justified precaution requires less precaution than the criterion of economic feasibility does, the criterion of economic feasibility rejects the criterion of cost justification outright.

Provisions of the Clean Water Act that mandate pollution control to the extent “technologically and economically achievable” also illustrate the economic prong of feasibility-based regulation.¹²⁴ The Clean Water Act subjects water pollution sources to two different sorts of effluent limitations: those based on “the best practicable control technology currently available” (BPT),¹²⁵ and those based on “the best available technology economically achievable” (BAT).¹²⁶ The BPT standard generalizes “the best existing performance” in an industry—control practices in “exemplary plants”—despite an expectation of “economic hardship, including the closing of some plants.”¹²⁷ The BAT standards are more stringent. They require “a commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges.”¹²⁸ Setting BPT standards involves “cost-benefit analysis,” but cost-benefit analysis is not part of BAT determinations.¹²⁹ In determining the economic achievability of a technology, “the EPA must consider the cost of meeting BAT limitations, but need not compare such cost with the benefits of effluent reduction.”¹³⁰

For “economic feasibility” analyses, then, the ultimate question is not whether costs are outweighed by benefits, but whether the industry is able to bear the cost.¹³¹ Economic feasibility regulation by OSHA means “protecting worker health and safety within the limits of economic possibility.”¹³² Again, Judge Wright explains:

The most useful general judicial criteria for economic feasibility comes from Judge McGowan’s opinion in *Industrial Union Dep’t, AFL-CIO v. Hodgson*. . . . A standard is not infeasible simply because it is financially

122. *Id.* at 389.

123. *Id.* at 387.

124. 33 U.S.C. §§ 1311(b)(2)(A), 1314(b)(2)(B), 1317(a)(2) (2012).

125. *Id.* § 1311(b)(1)(A).

126. *Id.* § 1311(b)(2)(A).

127. *EPA v. Nat’l Crushed Stone Ass’n*, 449 U.S. 64, 76 n.15, 79 (1980).

128. *Id.* at 74.

129. *Id.* at 71 n.10 (citation omitted).

130. *Rybachek v. EPA*, 904 F.2d 1276, 1290–91 (9th Cir. 1990) (internal quotation marks omitted).

131. *United Steelworkers of Am., AFL-CIO-CLC v. Marshall* 647 F.2d 1189, 1272 (D.C. Cir. 1980).

132. *Id.* at 1263 n.102.

burdensome, or even because it threatens the survival of some companies within an industry:

Nor does the concept of economic feasibility necessarily guarantee the continued existence of individual employers. It would appear to be consistent with the purposes of the Act to envisage the economic demise of an employer who has lagged behind the rest of the industry in protecting the health and safety of employees and is consequently financially unable to comply with new standards as quickly as other employers.

A standard is feasible if it does not threaten 'massive dislocation' to, or imperil the existence of, the industry. No matter how initially frightening the projected total or annual costs of compliance appear, a court must examine those costs in relation to the financial health and profitability of the industry and the likely effect of such costs on unit consumer prices. . . . [T]he practical question is whether the standard threatens the competitive stability of an industry, or whether any intra-industry or inter-industry discrimination in the standard might wreck such stability or lead to undue concentration. . . .¹³³

[A]s for [proof of] economic feasibility, OSHA must construct a reasonable estimate of compliance costs and demonstrate a reasonable likelihood that these costs will not threaten the existence or competitive structure of an industry, even if it does portend disaster for some marginal firms.¹³⁴

In the consolidated *American Textile* cases, litigating cotton dust standards, both the District of Columbia Circuit and the Supreme Court upheld OSHA's assessment of economic feasibility.¹³⁵ OSHA had concluded that "compliance with the standard [was] well within the financial capability" of the cotton industry.¹³⁶ The agency noted that "although some marginal employers may shut down rather than comply, the industry as a whole will not be threatened."¹³⁷ Both courts agreed that OSHA had shown that the industry would be able to absorb the projected costs.¹³⁸ According to the court of appeals, regulatory requirements remain economically feasible even though they "impose substantial costs on an industry . . . or . . . force some employers out of business," as long as they are not "prohibitively

133. *Id.* at 1265 (citations omitted) (quoting *Indus. Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467, 478 (D.C. Cir. 1974)).

134. *Id.* at 1272.

135. See *AFL-CIO v. Marshall*, 617 F.2d 636, 662 (D.C. Cir. 1979), *aff'd in part, vacated in part sub nom. Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 536, 540-41 (1981).

136. *Am. Textile*, 452 U.S. at 531 (citation omitted).

137. *Id.*

138. *Id.* at 530-36.



expensive” and do not make “financial viability generally impossible.”¹³⁹ Controls on cotton dust fit “the plain meaning of the word ‘feasible,’” the Supreme Court wrote, given OSHA’s conclusion “that the industry will maintain long-term profitability and competitiveness.”¹⁴⁰

OSHA makes the standards articulated by the courts more concrete in the course of applying them. Its assessment procedures approach the question of whether a particular standard of precaution will threaten the competitive stability of an industry by conducting an industry-by-industry analysis. The aim of that analysis is to determine the percentage of the industry’s revenues and profits that compliance will consume. One OSHA report explains the agency’s practice as follows:

[W]hile there is no hard and fast rule, in the absence of evidence to the contrary OSHA generally considers a standard economically feasible when the costs of compliance are less than one percent of revenues. . . . [P]otential impacts of such a small magnitude are unlikely to eliminate an industry or significantly alter its competitive structure particularly since most industries have at least some ability to raise prices to reflect increased costs. . . . There is an enormous variety of year-to-year events that could cause a one percent increase in a business’s costs, e.g., increasing fuel costs, an unusual one-time expense, changes in costs of materials, increased rents, increased taxes, etc.¹⁴¹

Thus, in a case where the costs of complying with a particular standard came to less than both 1 percent of an industry’s revenues and 10 percent of its profits, implementation of the standard did not threaten the competitive stability of the industry.¹⁴² The logic here is instructive.¹⁴³ OSHA’s approach assumes that revenue and profits normally fluctuate within certain limits. If an industry is able to absorb fluctuations within certain limits without seeing its competitive stability undermined, then a regulatory standard that has an impact in the same range will not threaten an industry’s competitive stability.

Of course, not every standard necessary to eliminate significant risk falls into this sweet spot of acceptable impact. Where an industry’s

139. *AFL-CIO*, 617 F.2d at 655, 661 (citations omitted).

140. *Am. Textile*, 452 U.S. at 530 n.55 (citations omitted).

141. Occupational Exposure to Hexavalent Chromium, 71 Fed. Reg. 10,100, 10,299–300 (Feb. 28, 2006) (to be codified at 29 C.F.R. pts. 1910, 1915, 1917–1918, 1926). “OSHA’s obligation is not to determine whether any plants will close, or whether some marginal plants may close earlier than they otherwise might have, but whether the regulation will eliminate or alter the competitive structure of an industry.” *Id.* at 10,281. I am grateful to Dov Waisman for calling this report to my attention. My discussion follows his. See Waisman, *supra* note 56.

142. Occupational Exposure to Hexavalent Chromium, 71 Fed. Reg. at 10,300. The standard at issue determines a permissible exposure limit for a particular toxic substance.

143. Waisman, *supra* note 56, at 675.

compliance costs considerably exceed these thresholds, OSHA makes industry-by-industry determinations of whether complying with a particular standard will threaten the industry's competitive stability. In these cases, the inquiry is centered on continued profitability. In analyzing the economic feasibility of a PEL of $1 \mu\text{g}/\text{m}^3$ and whether it would affect the electroplating industry, OSHA concluded that "the costs associated with such a PEL could alter the competitive structure of the industry."¹⁴⁴ The cost of the standard came to 65% of profits, though only 2.7% of revenue.¹⁴⁵ After considering demand elasticity for electroplating, OSHA concluded that "a price increase that would assure continued profitability for the entire industry would require almost tripling the annual nominal price increase. . . . That would represent a significant real price increase that might not be passed forward, particularly by older and less profitable segments of the industry."¹⁴⁶ Requiring a PEL of $1 \mu\text{g}/\text{m}^3$ might therefore make the activity of electroplating unprofitable. Making an industry unprofitable is, for OSHA, an unacceptable threat to its "competitive stability."¹⁴⁷

Under OSHA practice, then, the "economic feasibility" prong of feasibility analysis requires the reduction of significant risk up until the point where risk reduction threatens the competitive structure or competitive stability of an industry. Proposed risk reducing regulations reach the point at which they threaten the continued profitability of a business.

C. "SIGNIFICANT" RISK

Feasibility analysis, like safety analysis, requires the identification of significant risks of health injury.¹⁴⁸ The significance requirement receives its canonical exposition in *Industrial Union Department, AFL-CIO v. American Petroleum Institute*.¹⁴⁹ Writing for the Court, Justice Stevens agreed with the Fifth Circuit's holding that:

[Section] 3(8) [of the Occupational Safety and Health Act of 1970] requires the Secretary to find, as a threshold matter, that the toxic substance in question [here, benzene] poses a significant health risk in the

144. Occupational Exposure to Hexavalent Chromium, 71 Fed. Reg. at 10,301.

145. *Id.*

146. *Id.* at 10,301-02.

147. *Id.* at 10,102 (quoting *Indus. Union Dep't, AFL-CIO v. Hodgson*, 499 F.2d 467, 478 (D.C. Cir. 1974)).

148. Safety-based risk regulation requires the elimination of significant risks, whereas feasibility-based regulation only requires the elimination of such risks if feasible. There has been some retreat from this requirement of late. See Waisman, *supra* note 57, at 1263 n.1 (noting that the "safety-based" approach is "somewhat less prevalent" than feasibility analysis).

149. See *Indust. Union Dept., AFL-CIO v. Am. Petroleum*, 448 U.S. 607, 639-59 (1980).



workplace and that a new, lower standard is therefore “reasonably necessary or appropriate to provide safe or healthful employment and places of employment.” Unless and until such a finding is made, it is not necessary to address the further question whether [the requirement that the risk be reduced as far as technologically and economically feasible is triggered.]¹⁵⁰

Justice Stevens thus rejected OSHA’s contention that no significance requirement was necessary:

If the purpose of the statute were to eliminate completely and with absolute certainty any risk of serious harm, we would agree that [OSHA’s approach] would be proper But we think it is clear that the statute was not designed to require employers to provide absolutely risk-free workplaces whenever it is technologically feasible to do so, so long as the cost is not great enough to destroy an entire industry. Rather, both the language and structure of the Act, as well as its legislative history, indicate that it was intended to require the elimination, as far as feasible, of significant risks of harm.

By empowering the Secretary to promulgate standards that are “reasonably necessary or appropriate to provide safe or healthful employment and places of employment,” the Act implies that, before promulgating any standard, the Secretary must make a finding that the workplaces in question are not safe. But “safe” is not the equivalent of “risk-free.” There are many activities that we engage in every day—such as driving a car or even breathing city air—that entail some risk of accident or material health impairment; nevertheless, few people would consider these activities “unsafe.” Similarly, a workplace can hardly be considered “unsafe” unless it threatens the workers with a significant risk of harm.¹⁵¹

Therefore, before he can promulgate *any* permanent health or safety standard, the Secretary is required to make a threshold finding that a place of employment is unsafe because significant risks are present.

1. The Significance of a Risk: Quantity and Quality

“Significance” is an underspecified term of art. We can begin to clarify it, however, by noting that some risk of accidental harm is the price of activity itself.¹⁵² We cannot farm, build, drive, or fly without taking and

150. *Id.* at 614–15. Section 3(8) of the Act provides: “The term ‘occupational safety and health standard’ means a standard which requires conditions, or the adoption or use of one or more practices, means, methods, operations, or processes, reasonably necessary or appropriate to provide safe or healthful employment and places of employment.” 29 U.S.C. § 652(8) (2012).

151. *Id.* at 641–42.

152. The impossibility of preventing *all* accidental injury is a fundamental fact that any approach to accident law must acknowledge. James Buchanan, for example, begins his defense of caveat emptor in

imposing risks of devastating injury. We cannot help but eat and drink, yet eating and drinking expose us to risks of death and disease. We cannot help but travel, but traveling by whatever means we can devise—foot, car, horse, airplane, or rickshaw—puts both us and others in physical peril. Some risk is therefore unavoidable in two senses of the word. Some risk *cannot* be avoided without bringing activity to a halt, and some risk *should* not be avoided because it is better to bear the risks than to forego the activities that spawn them. Risks that cannot be eliminated without ceasing the activity that engenders them are both endemic, if slight, and the background against which all other risks arise. The fact that a low level of risk of devastating injury—the background level of risk—is an inescapable price of activity explains why a significance requirement must be introduced, implicitly or explicitly, into even the most stringent standards of risk regulation. Before we attempt to reduce a risk we must first conclude that it crosses the threshold that separates eliminable risks from ineliminable ones. We must decide if the risk in question crosses a threshold of significance.

“Significance,” thus, has much in common with the idea of “characteristic risk” found in common law strict liability doctrines. A “characteristic risk” of an activity is one whose long-run incidence is increased by the presence of the activity in the world. Increased incidence of drunken sailors stumbling around on shore leave is a characteristic risk of operating the Coast Guard.¹⁵³ Increased risk of inadvertent explosion is a characteristic risk of using dynamite in construction.¹⁵⁴ Similarly, increased risk of brown lung disease is a significant risk of milling cotton, increased risk of mesothelioma is a significant risk of occupational exposure to asbestos dust, and exposure to benzene in refining petroleum poses a significant risk of leukemia.¹⁵⁵ “Significance” in this sense has a pronounced quantitative dimension. It is a matter of the correlation between some form of harm and an activity. The flip side of this coin is that the elimination of

products liability law with the following comment:

It is useful to note at the outset that *accidents cannot be prevented*, in the sense that the probability of occurrence cannot be reduced to zero. We live in an uncertain world, whether we like it or not, and the working properties of either human or material agents cannot be completely specified. Any discussion of products liability, therefore, involves only the possible modification in the probability distribution of accidents.

James M. Buchanan, *In Defense of Caveat Emptor*, 38 U. CHI. L. REV. 64, 64 (1970). From a very different perspective, Ernest Weinrib gives a Kantian explanation of negligence law from the ground up by noting that everyone must both act in the world and accord an equal right to others to do so. See Ernest J. Weinrib, *Toward a Moral Theory of Negligence Law*, 2 LAW & PHIL. 37, 49–50 (1983).

153. Ira S. Bushey & Sons, Inc. v. United States, 398 F.2d 167, 171 (2d Cir. 1968) (Friendly, J.). See also *Taber v. Maine*, 67 F.3d 1029, 1037 (2d Cir. 1995) (Calabresi, J.).

154. *Exner v. Sherman Power Constr. Co.*, 54 F.2d 510, 512–13 (2d Cir. 1931).

155. See Daniel A. Farber, *Toxic Causation*, 71 MINN. L. REV. 1219, 1252, 1229–31 & n.55 (1987).

“significant” risk is a matter of reducing the incidence of some harm. The 1990 amendments to the Clean Air Act, for example, aim to “reduce lifetime excess cancer risks to the individual most exposed to emissions . . . to less than one in one million.”¹⁵⁶

Judgments of significance have an important quantitative aspect, but the concept of significance is not reducible to quantitative considerations. Judgments of significance are also inescapably evaluative. To be significant, a risk must ripen into serious harm—the kind of harm that severely compromises normal physical capacities. For example, occupational exposure to cotton dust can lead to byssinosis (commonly known as brown lung disease), a chronic, permanent disability resulting in reduced breathing capacity and premature death.¹⁵⁷ The relation of significance to serious harm builds qualitative evaluation into the concept of significance. The diseases and disabilities that the norms of safe and feasible precaution address deprive their victims of normal lifespans and normal capacities. The harms impair normal functioning in ways that cannot be repaired. The judgments of severity involved are inescapably evaluative because they measure the seriousness of harm against a baseline of normal life.

Moreover, significant risks are salient ones, and salience is a matter of standing out. Salient phenomena stand out in a *context*—against a background.¹⁵⁸ Salient risks are prominent risks, risks which jut out in the setting of the activity subject to regulatory scrutiny. *Probability* of harm can be expressed by a purely quantitative measure, but the importance of a particular probability of harm depends in part on the background against which that probability is framed. Even the purely quantitative criterion of significance employed by the 1990 amendments to the Clean Air Act operates against a background that fixes the acceptable level of risk. The salience of the risk of cancer addressed by those amendments depends on the background risk of cancer. Discussion of “excess cancer risks” presumes a preexisting risk of cancer—a risk independent of exposure to the particular emission being appraised. The Clean Air Act’s one-in-a-million threshold for “excess risk” thus defines an acceptable level of increased risk for a harm whose gravity we can largely agree upon, and of which there is a preexisting incidence.

156. 42 U.S.C. § 7412(f)(2)(A) (2012). *See also supra* notes 94–99 (describing the regulatory aims of the Clean Air Act).

157. *See* Am. Textile Mfrs. Inst. v. Donovan, 452 U.S. 490, 495–96 & n.8 (1981).

158. As Lewis Sargentich puts it, “[t]he risk to be averted must be . . . noteworthy in comparison with other risks of the same activity that might also be reduced further by costly measures.” KEETON ET AL., *supra* note 45, at 23-7 to -8.

Why settle on “one in a million” as the threshold separating acceptable increases in excess risk from unacceptable ones? Four reasons come readily to mind. First, that threshold defines a negligible level of risk, a level of risk that we might reasonably disregard entirely. Reducing a risk to the point where it might reasonably be disregarded entirely is, presumably, reducing it to the point where it is no longer significant. Second, we already face greater threats in our daily lives—for example, the annual risk of death by automobile accident is approximately 1 in 9,160,¹⁵⁹ and the annual risk of death from cancer is approximately 1 in 540.¹⁶⁰ Given these other threats, we may feel justifiably comfortable in *entirely* disregarding excess risks of cancer of less than one in a million—in treating them as functionally equivalent to no risk at all.¹⁶¹ Third, we might choose to tolerate excess risks of cancer less than one in a million—but not risks greater than that—because the background risk of cancer is alarming, and we are eager not to see it increase. Fourth, “one in a million” has a natural prominence—a salience—as a measure of significance arbitrary in its exactitude but sensible in its general order of magnitude. Who would fix on “one in 997,832?”¹⁶²

2. Salience and the Significance of Context

The natural prominence of the “one-in-a-million” threshold as a test of significant risk can create the impression that the salience of a risk really is a quantitative matter. This is mistaken. Consider the phenomenon of sudden acceleration, which arose most recently in connection with cars manufactured by Toyota.¹⁶³ We reasonably expect that a car will not accelerate unexpectedly and uncontrollably. Against the background of that

159. In 2015, there were 10.9 automobile accident fatalities for every 100,000 people. *Fatality Analysis Reporting System (FARS) Encyclopedia*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., <http://www-fars.nhtsa.dot.gov/Main/index.aspx> (last visited Feb. 1, 2018).

160. In 2015, the death rate for all cancers was 185.4 for every 100,000 people. Sherry L. Murphy et al., *Deaths: Final Data for 2015*, NAT'L VITAL STATISTICS REP., Nov. 27, 2017, at 1, 6 tbl.B, https://www.cdc.gov/nchs/data/nvsr/nvsr66/nvsr66_06.pdf.

161. See, e.g., S. REP. NO. 103-349, at 76 (1994) (“[T]he term ‘reasonable certainty of no harm’ means an increased risk of cancer to an individual exposed over a lifetime of no more than one in one million.”).

162. Kathryn Kelly’s critical account of the origins of the one-in-a-million standard lends some support to this hypothesis. Two scientists randomly chose a safety standard of one in one hundred million in a 1961 article attempting to define when exposure to a substance could be considered “safe.” The FDA adopted that number in a 1973 notice in the Federal Register, and changed it to one in one million by the time that final rule was issued in 1977. See Kathryn E. Kelly, *The Myth of 10⁻⁶ as a Definition of Acceptable Risk*, Presentation at the Annual Meeting of the Air and Waste Management Association 4–5 (June 1991).

163. See, e.g., Chris Woodyard, *New Toyota Sudden Acceleration Claim Surfaces*, USA TODAY (Sept. 11, 2014, 9:17 PM), <http://www.usatoday.com/story/money/cars/2014/09/11/toyota-corolla-nhtsa-unintended-acceleration/15477263>.



reasonable expectation, *any* perceptible association of sudden acceleration with particular vehicles is a salient, and unacceptable, increase in risk. The risk of gas tank explosions in automobile accidents—the subject of the famous Ford Pinto case—is also instructive, and perhaps richer.¹⁶⁴ Among the myriad risks of automobile accidents, the dangers of fire and explosion stand out. The explosive properties of gasoline make it especially dangerous. Most of us imagine that it is particularly horrible to be burned to death, and many of us may think it worse still to survive a terrible fire horribly disfigured. These judgments involve assessments of magnitude that might be expressed quantitatively: people might be able to rank injury by gasoline explosion on a scale with other possible injuries from automobile accidents, and we might be able to assign a number to the relative disvalue that they place on such injuries. But a judgment that the risks of gasoline tank failure are a significant risk of driving is both evaluative to its core and inherently comparative. And comparison cannot be made without attending to context, a point illustrated by the difference in significance of risks of gas tank explosions in motorcycles and cars, respectively.

The risks of gas tank explosions are probably greater in motorcycles than in cars, because the gas tanks (though smaller) are less protected against collision, and riders are both closer to and less protected from their gas tanks.¹⁶⁵ Let us suppose then, that motorcycle gas tanks are more dangerous to motorcyclists than sedan gas tanks are to sedan drivers and passengers. Does it follow that the risk of gas tank explosions is as significant for motorcycles as it is for passenger cars? It seems unlikely to me that it does. Even if gas tank explosions are equally frequent and more dangerous in motorcycles than in passenger cars, the risk of gas tank explosion is qualitatively more significant in passenger cars. The risks associated with motorcycle gas tanks are framed by the heightened risks characteristic of motorcycles. The relatively small size of motorcycles in comparison with cars and trucks and the exposed nature of riding on a motorcycle subject motorcyclists to a host of other substantial risks. Motorcyclists bear greater-than-normal risks of being crushed in collisions with other vehicles, greater-than-normal risks of being thrown from their cycles, and greater-than-normal risks of severe head trauma, to name just three. Risks of gasoline tank explosion do not stand out as especially salient—especially significant—in

164. See generally *Grimshaw v. Ford Motor Co.*, 174 Cal. Rptr. 348 (Ct. App. 1981) (affirming judgment against an automobile manufacturer for damages sustained by a driver arising from gas tank explosion).

165. In 2015, fires occurred in 0.1% of the vehicles involved in all traffic crashes. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., TRAFFIC SAFETY FACTS 2015, at 86 tbl.39 (2017), <https://crashstats.nhtsa.dot.gov/Api/Public/Publication/812384>.

such company.

The heightened risks of gas tank explosion in sedans stand out more starkly because sedans are safer. Purchasers of subcompact family sedans seek a higher level of safety than do motorcycle buyers. They do not choose to forego the protections of a passenger compartment for themselves and their offspring in exchange for the thrills of immediate exposure to both road and machine. Implicit in the purchase of a subcompact family sedan is a desire for reasonably safe transportation, consistent with the constraints imposed by the fact that the car being purchased is a comparatively inexpensive subcompact. In this context, the risks of gas tank fires stand out, quite independent of any hidden flaw in the car. For people who are trying to keep their children safe, the risks of an automobile's gas tank are especially salient. Gasoline explosions threaten horrible deaths, disfigurements, and terrible psychological trauma.¹⁶⁶ These characteristics make the risks of gas tank explosion in subcompact cars qualitatively significant in a way that risks from motorcycle gas tanks are not, even if the risks of motorcycle gas tanks are quantitatively much greater.¹⁶⁷

The *significance* of a risk, then, is not simply a matter of quantity, understood as statistical probability and magnitude measured numerically. Significance depends on both gravity and salience. Determining the gravity of a risk requires evaluative and qualitative judgments—judgments about how much we should fear a particular kind of harm or harms, how much a particular harm impairs the pursuit of a normal life, how bad it would be to live with that harm, and so on. Determining the salience of a risk requires not just an appraisal of the risk's numerical probability, but also an evaluation of how prominent the risk is in comparison to other risks of the activity responsible for the risk at issue.

IV. SAFETY, FEASIBILITY, AND SIGNIFICANCE

These standards and concepts of safety and feasibility analysis constitute reasonably coherent, well-developed legal regimes. However,

166. Aspects of the Pinto's design made the failure of its gas tank even more salient. In comparison with other subcompact cars, the design of the gas tank was substandard. Schwartz, *supra* note 32, at 1027–28.

167. Some readers may worry that what is at work here is simply an “availability heuristic,” a form of irrationality made famous by Amos Tversky and Daniel Kahneman in *Availability: A Heuristic for Judging Frequency and Probability*, 5 *COGNITIVE PSYCH.* 207 (1973). In some cases, this worry may be well-founded. In other cases, the framework deployed by the “availability heuristic” literature may be guilty of reductionism by treating qualitatively different risks as if they were identical. The only way to settle the matter is by determining if we have good reasons to fear some risk (e.g., gas tank explosions) more than another risk.

these concepts, along with the structure of safety and feasibility analysis, also raise three basic questions. First, when we push beyond the cost-justified level of safety, why should we eliminate only significant risks of serious physical harm? Why not eliminate all risks of physical harm? Second, why should we sometimes require the elimination of all significant risks of injury and other times require only the elimination of those significant risks whose elimination is feasible? Why are we prepared to shut down some activities that cannot be made safe, but not others? Third, what kind of connections are there between the priorities these standards place on avoiding harm and the harm-benefit asymmetry?

A. WHY LEAVE INSIGNIFICANT RISKS OF DEVASTATING INJURY UNTOUCHED?

Safety-based risk regulation is both strikingly stringent and surprisingly lax. Both the 1990 amendments to the Clean Air Act and the Supreme Court's opinion in *American Petroleum* make clear that the elimination of significant risk is not the same as the elimination of all risk.¹⁶⁸ So the "safe level" of risk is not the same as "no risk." Second, safety-based regulation is all risk evaluation and no cost assessment. Significant risks must be reduced until they are insignificant—without regard to cost—but insignificant risks are tolerated, also without inquiring into the cost of eliminating them. As familiar as we are with cost-benefit analysis and its insistence on balancing costs and benefits so as to extract the greatest possible net benefit from risky but valuable activities, we can hardly help but be struck by the fact that categorical judgments of significance push risk reduction beyond the point of maximal benefit, economically conceived. But the doctrine's lenient side is as striking as its stringent side; it leaves insignificant risks entirely untouched. Why should a standard that forbids trading safety against costs above some threshold level of risk have a threshold to begin with? Even insignificant risks of devastating injury are risks of devastating harm. A lifetime cancer risk of less than one in a million is still a risk of a devastating disease, and devastating disease, when it materializes, wreaks havoc in someone's life. Even an insignificant risk of devastating disease can end a life prematurely and traumatically. At best, being afflicted with a devastating disease severely impairs life, foreclosing the pursuit of certain activities and ways of life, seriously hampering the pursuit of others, and often leaving us with enduring, agonizing pain and suffering. Why should we tolerate any risk of such harm?

168. See *supra* notes 104 & 107 and accompanying text.

An answer to that question lies in the fundamentals of the predicament with which the law of accidents must grapple. We each have various aims, ends, and aspirations to pursue over the course of our lives. We may each expect, with decent luck, to pursue our aims and aspirations over the course of normal life spans. In order to pursue our aims and aspirations effectively over the course of complete lives, however, we need both the freedom to act (liberty) and physical integrity (freedom from physical harm, or security). Like Rawls's "primary goods," liberty and security are things that we each need if we are to realize any aims or aspirations.¹⁶⁹ Liberty is essential because we can neither survive, nor realize much of anything of value, unless we are free to engage in a wide range of activities. But security is equally essential. Physical injury can end our lives prematurely or leave us permanently impaired in ways that prevent us from pursuing many valuable ends and aspirations. Indeed, even injuries that do not kill or permanently harm us may disrupt our lives in ways that utterly upend our life plans.

Our predicament is that liberty and security conflict. Perfect safety is unattainable. Risk of physical harm—diminished security—is the byproduct of action. Diminished liberty is the price of increased security. We cannot farm, build, drive, fly, eat and drink, or mill cotton and refine benzene without taking and imposing risks of devastating injury. Foregoing all activity would itself be a short path to death, and even if death could somehow be avoided, foregoing all activity would cripple the pursuit of our aims and aspirations as surely and severely as devastating physical injury does. A world in which no one moves is a world in which few, if any, aims, ends, and aspirations can be realized, and few, if any, lives can be led. We must therefore bear the level of risk that this Article earlier called the background level of risk.¹⁷⁰ Background risks are worth bearing because eliminating background risks does even more harm to our ability to lead the lives we wish to lead than does bearing those risks. This is true even though the risks are sure to result in some devastating injuries. The background level of risk must be accepted despite the fact that level results in some devastating injuries, because some risk of devastating injury is the price of activity and activity is worth having. Without a "significance" requirement, one essential condition for leading a worthwhile life—the freedom to act in the world—would be destroyed in the name of another essential condition, namely, safety. The elimination of *all* discernible risk requires the elimination of all

169. See JOHN RAWLS, *POLITICAL LIBERALISM* 181 (1993) (listing five primary goods as basic rights, freedom of opportunity, participation in political and economic institutions, income and wealth, and self-respect).

170. See *supra* Part III.C.1.

discernible activity. And the elimination of all discernible activity is a cure worse than the disease it treats.

B. WHY EXCLUDE COSTS ENTIRELY?

The threshold of significance is the first distinctive feature of safe-level analysis. The second is its disregard of the costs of reducing risks to the point of insignificance. Consider, for example, the determination in the Food Quality Protection Act of 1996 that tolerances for pesticide residue must be set at a level that is safe, where “safe” means that “there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information.”¹⁷¹ This determination expresses a legislative judgment that the costs of reducing pesticide residues to safe levels not only *may* be disregarded entirely, but *must* be disregarded entirely. Structurally, then, safety-based regulation is radically different from cost-benefit analysis. To determine an appropriate level of safety, cost-benefit analysis insists on balancing all relevant considerations (as it conceives them) in a comprehensive calculus. Safety-based regulation insists on *excluding* an entire class of arguably relevant reasons—namely, costs—from the exercise of fixing an acceptable level of risk.¹⁷²

Why—or in what contexts—should we disregard entirely the costs of eliminating significant risks, pursuing risk reduction until we have cut the risk to the point at which it is no longer significant? In answering this question, it helps to realize that the safety norm defines an attractive social world so far as risks of physical injury are concerned. The risks that it tolerates are ones with a probability so low that we may reasonably ignore them, even though someone will be unfortunate enough to be harmed by them. A social world sufficiently safe that each of us might reasonably expect to live a life of normal length—secure in the knowledge that we can reasonably expect that our lives will not be cut short by death or devastating injury—is an immensely attractive social world. Indeed, we might very well believe that an ideally just society would generally succeed in realizing the safety norm.

In our non-ideal world, the interaction of the safety and feasibility

171. Food Quality Protection Act of 1996, Pub. L. No. 104-170, sec. 405, § 408(b)(2)(A)(ii), 110 Stat. 1489, 1516 (codified as amended at 21 U.S.C. § 346a (2012)).

172. The “exclusionary” character of safety-based risk regulation is not odd in an important sense. Most norms of practical reason instruct people to disregard some relevant reason(s). *See generally* JOSEPH RAZ, PRACTICAL REASON AND NORMS (1975). We are investigating something more particular here: why exclude costs entirely?

norms suggests a slightly different normative commitment. The basic premise of the safety norm is that we should not sacrifice such a world unless we stand to gain something of comparably great value. We should, therefore, eliminate significant risks of injury when the costs of doing so are not comparable to the devastation that significant risks are sure to inflict. This deceptively simple answer suggests a division of labor between safety and feasibility-based risk regulation. Safety-based risk regulation is appropriate when the costs of reducing risks of devastating injury to the point at which they are no longer significant are *not* comparable to the costs of bearing those risks of devastating injury. Feasibility-based risk reduction is appropriate where the costs of reducing risks of devastating injury to the point at which they are no longer significant *are* comparable to the cost of bearing those risks of devastating injury.

C. COMPARABILITY AND SAFETY-BASED RISK REGULATION

The harms threatened by the risks that are subject to safety-based regulation are a particular sort of irreparable injury. The costs of unsafe food, air, and water include irreparable injury to health, and health is an essential condition of effective human agency—a kind of primary good. What about the benefits of bearing risks to health, or the flip side of the coin, the costs of reducing such risks? How should we characterize them? Pesticide residue on our crops is the byproduct of the pursuit of greater agricultural productivity. Toxins in our air and water are byproducts of ordinary, economically productive activities. The enactment of safety-based regulatory statutes expresses a categorical judgment that the costs these productive activities must bear in order to eliminate significant risks of devastating harm are acceptable. We need not inquire into the costs of eliminating significant risk on a case-by-case basis, and we need not attend to the marginal balance of cost and benefit in any particular case, because the benefits of significant risk are simply not comparable to the incidence of harm to human health that is their price. The safety-based regime in place for the regulation of the risks of pesticide residues on agricultural products, for example, expresses the conclusion that no amount of increased agricultural productivity can justify imposing a significant risk of devastating disease. The benefits of more risk—the increased yield in crops harvested per acre planted and the like—are not the kind of benefits that can justify the increased incidence of devastating injury that is their price.

Why might a reasonable legislature come to the conclusion that the benefits of increased agricultural productivity cannot justify imposing a significant risk of devastating injury? In part, because a reasonable

legislature may reject the central idea of unrestricted cost-benefit analysis: that all goods are commensurable, fungible at some ratio of exchange. Laws like the Food Quality Protection Act of 1996 reject this assumption of fungibility. They single out health for special protection. Safety-based statutes assume that health—like the physical integrity of the person—is a primary good, something that persons need in order to realize their aims and aspirations over the course of a normal life span, whatever those aims and aspirations may be.¹⁷³ Health has a special urgency. It is part of a package of goods that are essential conditions of normally effective agency, and it takes priority over lesser, inessential goods. The harm-benefit asymmetry reflects this priority.

Within this framework, *foregoing* the benefits of the increased agricultural productivity that might be won by tolerating more risk than the safe-level standard tolerates might be justified by showing that increased productivity does not meet a need as urgent as health. Conversely, showing that satisfying the safe-level standard would prevent some citizens from securing adequate nutrition, and that adequate nutrition for all might be secured by tolerating more risk, would show that increased productivity did meet a need as urgent as health.

1. Contingency and Comparability

A hierarchical view of human interests is one central piece of safety-based risk regulation, but not the whole of it. Individually and collectively, people exercise their agency by investing it in activities and projects. They thereby acquire more particular interests. In determining the appropriate level of safety, we must decide how important various investments of human agency are. Tacitly, safety-based risk regulation rests on particular historically and socially contingent facts, and on particular historically and socially contingent assessments about the importance of various interests. The Food Quality Protection Act of 1996, for example, rests implicitly on the claim that more yield per acre of crop planted is not a good able to be compared to a significant risk of irreparable health injury. Why? Because health is, for each of us, an essential condition of effective agency, whereas the benefits of increasing the yield of crop per acre are not—for us, here and now—measured in the attainment of an equally essential condition of effective agency. The benefit of increased agricultural productivity is simply increased wealth, and the wealth obtained is not an essential condition of anyone's agency. The benefits of increased agricultural productivity do not

173. See RAWLS, *supra* note 169, at 187–90 (describing primary goods as “citizens’ needs”). This conception of certain goods as primary is the flip side of the coin of the general badness of physical harm.

meet comparably urgent needs. We should not, therefore, treat risks to health and yield per acre as commensurable goods and let maximum overall benefit fix the proper balance between them. Were we poorer, matters might well be different. The benefit of increased agricultural productivity might be measured in our ability to provide adequate nutrition to each member of our society. Adequate nutrition *is* an essential condition of effective agency, one comparable to health in its urgency. Contingent social facts thus make the benefits of increased agricultural productivity not comparable to significant health risks.

The same combination of a hierarchical conception of human interests with historically and socially contingent facts is capable of explaining and justifying the application of safety-based risk regulation to air and water pollution. Breathing and drinking, like eating, are unavoidable activities. Breathing air and drinking water should not put our health in significant peril unless the cost of eliminating that peril threatens our agency in some comparable way. In an affluent society, the cost of eliminating significant health risks to the water we drink and the air we breathe is not comparable to the cost of bearing such risk. In poorer or less technologically advanced societies, it might be impossible to reduce the risks of air and water pollution to an insignificant level without seriously impairing basic agricultural production, or other essential productive activities. Impairing essential productive activities might threaten the health of those whose health we are attempting to protect more than the pollution that we are seeking to eliminate.¹⁷⁴ Safety-based risk regulation, in short, is justified when eliminating significant risks of devastating injury does not compromise, in a comparable way, a need or a good that is as important as health or physical integrity. Health is a need, not a want, and it should be compromised only in order to obtain some sufficiently valuable benefit.

When are burdens comparable? When bearing the precaution necessary to reduce a particular class of significant risk of devastating injury to the point of insignificance is a cure worse than the disease of bearing the burden of devastating injury that is the price of significant risk. Consider, for example, the significance requirement itself, and the burden of eliminating all risk including insignificant risk. The price of eliminating *all* risk is the cessation of all activity. The elimination of all activity burdens an essential condition of agency—the freedom to act—even more than insignificant risk

174. Both the safety and the feasibility norms are especially protective of those most imperiled by the risks that these norms regulate. When the distribution of burdens and benefits is at issue, “our attention is naturally directed first” to the claims of those who bear the greatest burdens, “because if anyone has reasonable grounds for objecting to the principle it is *likely* to be them.” SCANLON, *supra* note 57, at 145.

of devastating injury burdens the physical integrity of the person, another essential condition of human agency. The burden of eliminating *all* risks of devastating injury, for example, is greater than the burden of bearing insignificant risks, because the elimination of all risks requires the elimination of all activity.

Comparability with respect to effects on urgent human interests thus marks the point at which further reductions in risk may no longer be desirable. Within federal risk regulation, feasibility-based regulation of risks replaces safety-based regulation when the burdens of reducing significant risk pose comparable threats to effective human agency. When are burdens to major, productive economic activities—the kind governed by both safety- and feasibility-based risk regulation—comparable to significant risks of devastating injury? Feasibility-based risk regulation is constructed around an answer to that question. Burdens to ordinary, productive economic activities—activities like milling cotton, refining petroleum, and growing crops—are comparable to significant risks of devastating injury when they threaten the long-run flourishing of those activities. Feasibility-based risk regulation supposes that the good realized by major, productive activities is comparable to, and generally greater than, significant risk of devastating injury. Conversely, feasibility analysis supposes that reducing these risks beyond the point of efficient precaution is justified because the costs of such precaution are dispersed across consumers, employers, shareholders, and so on. The members of those classes are in the position of the viewers of Scanlon's sporting competition.¹⁷⁵ The costs they must bear under a norm of feasible precaution are not comparable to the harms to workers that feasible precaution avoids.

D. COMPARABLE VALUE AND FEASIBLE RISK REDUCTION

Workplace risks are the primary domain of feasibility-based risk regulation; OSHA is the primary practitioner of feasibility analysis; and workers are the primary beneficiaries of the feasibility standard. As practiced by OSHA, feasibility-based risk regulation presumes that the productive economic activities to which it applies are sufficiently valuable that shutting them down would cause greater hardship than will bearing the exposure to their significant risks of serious harm. Feasibility-based risk reduction supposes that allowing major productive activities to continue even when their continuation involves imposing significant risks of devastating injury is, at least, the lesser of two evils. For example, shutting down major

175. See SCANLON, *supra* note 13, at 235; *supra* text accompanying note 89.

productive activities such as milling cotton and refining petroleum would work a greater long-term hardship to the workers who bear the brunt of the activities' risks than asking those workers to accept significant risks of devastating injury does. The burdens to workers are the natural focal point for appraising relative hardships, because workers are both the principal victims of the activities' risks and the principal beneficiaries of feasibility-based risk regulation. Because their lives and their health are endangered, and because increased safety competes with their job security, their claims have a special urgency and priority.

There is a strong resemblance between the view that feasibility-based risk regulation takes of the significant risks of major, productive activities, and the view that safety-based risk regulation takes of insignificant risk. Feasibility analysis tolerates significant risk when it is the price of particular major, productive activities. Safety-based risk regulation tolerates insignificant risk as the price of activity itself. Even under the best of circumstances, safety-based risk regulation supposes that a background level of risk of devastating physical injury must be accepted, because the cost of eliminating that risk is the prohibition of all activity, and the prohibition of all activity is a cure worse than the disease. The elimination of all risk of devastating physical injury paralyzes our lives, impairing our pursuit of valuable ends and activities more than the background level of risk itself does. Feasibility analysis applies these ideas in a more particular way. It holds that we are justified in accepting a level of risk greater than the background level of risk—a significant level of risk—when our only alternative is to shut down a valuable activity. The implicit judgment here is that shutting down the particular activities to which the feasibility norm applies does not further the fundamental interests of those that the activity most endangers but sets those interests back.

1. Feasibility Analysis as Practiced by OSHA

OSHA standards quoted in *American Textile* nicely illustrate the application of feasibility analysis in both its technological and economic aspects, and the relation of feasible risk reduction to safety-based risk reduction. Cotton dust is the primary cause of byssinosis or “brown lung disease,” a serious, potentially disabling disease; because exposure to cotton dust is the primary cause of brown lung disease, the disease is “a distinct occupational hazard associated with cotton mills.”¹⁷⁶ At the time of

176. *Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 495–96 & n.8 (1981) (quoting Occupational Exposure to Cotton Dust, 43 Fed. Reg. 27,350, 27,352–54 (June 23, 1978); Occupational Exposure to Cotton Dust, 41 Fed. Reg. 56,498, 56,500–01 (Dec. 28, 1976)) (“Byssinosis is a ‘continuum . . . disease,’

American Textile, an estimated 100,000 current and former cotton workers suffered from byssinosis, with about 35,000—one in twelve in the industry—having the most severe grade.¹⁷⁷ To combat the epidemic, OSHA concluded that an upper limit of 0.2 mg of dust per cubic meter, or 200 $\mu\text{g}/\text{m}^3$, should be used to define the PEL for exposure to cotton dust over the course of an eight-hour workday.¹⁷⁸ “Although recognizing that permitted levels of exposure to cotton dust would still cause some byssinosis, OSHA nevertheless rejected . . . a 100 $\mu\text{g}/\text{m}^3$ PEL because it was not within the ‘technological capabilities of the industry.’”¹⁷⁹ Even the best attainable level—the technologically feasible level of 200 $\mu\text{g}/\text{m}^3$ —was in some cases economically infeasible, and so levels as high as 750 $\mu\text{g}/\text{m}^3$ were thus accepted for weaving and slashing—one activity within the enterprise of milling cotton—because lower levels could not be achieved “even with massive expenditures by the industry.”¹⁸⁰

The basic criterion of comparability employed by feasibility analysis is a localized and more relaxed application of the criterion employed by safety analysis. Safety analysis views the shutting down of all activity as a burden sufficient to justify bearing *insignificant* risk of devastating injury from any given activity. Feasibility analysis considers the crippling of major productive activities in our market economy as a burden sufficient to justify bearing *significant* risk of devastating injury from such activities. When it is technologically impossible to reduce some risk of an industrial activity, the only way to eliminate the risk is to eliminate the activity. When it is economically infeasible to do so, technologically feasible risk-reducing measures threaten the profitability of the activity and therefore call its long-term survival into doubt.

There are (at least) two different points of view from which the impact of shutting down significant productive activities in a market economy might be appraised. One is that of those whom feasible risk reduction seeks to protect—namely, representative workers. From this perspective, the claim

that has been categorized into four grades. . . . Known generally as the Schilling classification grades, they include: [Grade] 1/2: slight acute effect of dust on ventilatory capacity; no evidence of chronic ventilatory impairment. [Grade] 1: definite acute effect of dust on ventilatory capacity; no evidence of chronic ventilatory impairment. [Grade] 2: evidence of slight to moderate irreversible impairment of ventilatory capacity. [Grade] 3: evidence of moderate to severe irreversible impairment of ventilatory capacity.”).

177. *Id.* at 498.

178. *Id.* at 500.

179. *Id.* at 504 (quoting Occupational Exposure to Cotton Dust, 43 Fed. Reg. at 27,359–60).

180. *Id.* (quoting Occupational Exposure to Cotton Dust, 43 Fed. Reg. at 27,360) (noting also that PELs for some other milling activities were set at 500 $\mu\text{g}/\text{m}^3$ on technological-feasibility grounds).

that shutting down the activity is a cure worse than the disease asserts that a representative worker would be done more harm by the cessation of the activity and loss of position than they would be by bearing a significant risk of serious, debilitating harm. For anyone who is not independently wealthy, a job is a primary good in its own right. The loss of that good might very well inflict more injury on their lives than continuing to work under significant threat of serious and irreparable physical harm. The counter-argument here, of course, is that just how bad it is to lose one job depends on just how hard it is to land another. Feasibility analysis does not engage in this kind of opportunity cost analysis, however, which suggests that we should search for another line of argument. Before we do so, we should note the other point of view from which the impact of shutting down significant productive activities might be assessed. That point of view is not that of those most imperiled by the activities, but the point of view of the rest of us: those of us who reap the benefits of milling cotton and refining petroleum without having to bear the serious health risks of those activities. The question from this point of view is whether the rest of us can do without these activities. Controversially, feasibility analysis supposes that we cannot.

2. Justifying Feasible Risk Reduction

Courts have had relatively little to say about the justification for the feasibility standard. Features of the practice, however, prompt the following thoughts. First, the major, productive economic activities whose long-run flourishing feasibility-based risk regulation accepts as more important than the elimination of significant risks of devastating injury are more than net beneficial. We cannot really entertain the possibility of living without those activities. Life as we know it really does depend on refining petroleum. That our dependence on petroleum (or cotton) is historically contingent and transient does not diminish petroleum's present importance. If the price of eliminating their "significant" risks is the elimination of the activities themselves, then the significant risks of these activities are risks that we cannot imagine avoiding. Second, the major productive activities to which feasibility analysis applies are not relevantly distinguishable from each other. The reasons that we have for putting up with the significant risks imposed by refining petroleum are the same reasons that we have for putting up with the significant risks of milling cotton. The case for shutting down one major productive activity is therefore a case for shutting down all similar activities. That price is too high to pay for the elimination of significant risk.

One claim implicit in the first point is that contingent social facts—accidents of history, if you like—can embed themselves so deeply in the

structure of our social life that what once might never have taken root can now only be uprooted at enormous cost. We can readily imagine social worlds without cotton clothing or petroleum products. We know that such social worlds have existed in the past, and we expect a social world without petroleum products to exist at some point in the future. For now, however, avoiding these activities is not a plausible option. Shutting down the activity of refining petroleum, for example, is essentially unthinkable. Petroleum products are knit so tightly into the fabric of our daily lives that we cannot simply decide to do without them.

The second idea applies a test of generalization and makes a claim about the outcome of that test. This criterion parallels and repeats, in a more localized manner, an important part of the argument for tolerating *insignificant* risks of devastating physical injury. Suppose that we chose to stop milling cotton or refining petroleum because these activities cannot be conducted without imposing significant risks of devastating injury. Fairness would then require us to stop all similar productive activities—all major, productive activities that cannot be conducted without imposing significant risks of serious impairment.¹⁸¹ If milling cotton and refining petroleum are typical of the class of productive activities to which feasibility analysis applies, this result is unacceptable. Perhaps the life prospects of those most endangered by cotton milling would be better if we eliminated that activity and no other class of persons would suffer a worse hardship than those most endangered by cotton milling now do. Perhaps the same is true if we ceased refining petroleum (although I doubt it). But the more activities we add to the list, the less plausible the claim is that we are avoiding greater threats to effective agency in exchange for lesser threats.

It is, in short, eminently reasonable to believe that shutting down most of the major productive activities in our economy would work more harm than bearing the significant risks of serious harm that these activities impose. And it is unreasonable to think that we can live without major productive activities. To return to the first of the two perspectives mentioned earlier,

181. This kind of generalization test is common in ordinary negligence analysis. *See, e.g.*, *Grace & Co. v. City of L.A.*, 168 F. Supp. 344, 348–49 (S.D. Cal. 1958) (holding that it would be unreasonable to rule that the defendant should have inspected a graphite water pipe, which had not been inspected in forty years and which damaged plaintiff's property when it burst, because the costs of unearthing and inspecting every buried pipe every two to three years "would be prohibitively expensive and economically unfeasible"); *Clinton v. Commonwealth Edison Co.*, 344 N.E.2d 509, 515 (Ill. App. Ct. 1976) (holding that the plaintiff's proposed precaution of requiring the defendant utility to insulate the 720-volt power line that had electrocuted a fifteen-year-old boy was unreasonable as a matter of law because it would be "tantamount to requiring defendants and all who are engaged in the business of supplying electrical service to insulate all of their lines").

shutting down most of the major productive activities in our economy almost certainly would not create more favorable conditions for those employed by the activities (and most exposed to their risks) to exercise their autonomy.¹⁸² Working is both a primary good essential for the exercise of agency, and a way in which people realize the ends and values that make autonomy something worth having.

V. THE SENSE IN SAFETY AND FEASIBILITY ANALYSIS

Cost-benefit analysis aspires to mimic the market, and the market treats everything, good or bad, as fungible at some ratio of exchange. In conceptualizing matters this way, cost-benefit analysis is starkly at odds with our ordinary moral intuitions. The health and physical integrity of our persons are not goods that we are inclined to regard as fungible with, say, fine jewels and expensive wines. Desperation aside, no one sells parts of their physical persons, and we would surely think that there was something wrong with someone who was prepared to part with a limb to pay for a luxury good.¹⁸³ Health and safety are needs, and needs have priority over mere wants. These convictions are controversial, but they are also widely shared by people who consider themselves politically liberal. Unsurprisingly, these statutory standards were the product of liberal law reform in full flower and they rest on a political morality that is liberal in the philosophical sense. That political morality supposes that the fundamental role of the state and, therefore, of the legal system, is not to promote social welfare, but to secure for every citizen the basic conditions for each citizen to pursue their own good—their own happiness—as they understand it.

This kind of view is neither welfarist nor consequentialist. It takes

182. The Court considered this type of argument in *Whitman v. American Trucking Ass'ns*, 531 U.S. 457, 466–67 (2001) (citations omitted):

[R]espondents argue . . . [that] the economic cost of implementing a very stringent standard might produce health losses sufficient to offset the health gains achieved in cleaning the air—for example, by closing down whole industries and thereby impoverishing the workers and consumers dependent upon those industries. That is unquestionably true, and Congress was unquestionably aware of it . . . Section 110(f)(1) of the CAA permitted the Administrator to waive the compliance deadline for stationary sources if, *inter alia*, sufficient control measures were simply unavailable and “the continued operation of such sources is *essential . . . to the public health or welfare.*”

183. In India, some beggars are purposefully disfigured in order to play on sympathies and make more money. Randeep Ramesh, *Indian Doctors Accused in 'Arms-for-Alms' Scandal*, *GUARDIAN* (July 31, 2006), <http://www.theguardian.com/world/2006/jul/31/india.randeepamesh>. In Bangladesh, the “beggar mafia” will often “intentionally impair healthy children in various cruel methods and force[] them to get into beggary.” Abdullah Al Helal & Kazi Shahdat Kabir, *Exploring Cruel Business [sic] of Begging: The Case of Bangladesh*, 3 *ASIAN J. BUS. & ECON.* [n.p.] (2013). These examples show that there are social conditions under which people cannot live decent lives—not that physical integrity is just another commodity to be consumed.

consequences into account in designing institutions and rights, but it does not take consequences in an end state of the world to be the sole or master value. In its most powerful contemporary form, this kind of view “takes as basic not the value of the state of affairs that an action or policy would lead to but rather the justifiability of [the] action or policy” to those that it governs.¹⁸⁴ Its project is to devise laws and institutions which protect fundamental individual interests, especially freedom. It supposes that, in general, the best way to promote well-being is to leave it to individuals to pursue happiness as they see fit. The central value of the liberal tradition is not welfare, but freedom. The primary role of legal and political institutions, therefore, is not to promote social welfare, but to construct a framework in which the essential interests of each person are protected, and reasonably favorable conditions for people to lead their own lives are established.

Within a framework which takes our separateness and independence as persons to be fundamental, and which understands persons as agents who have a fundamental interest in authoring their own lives, harm has a special significance and its avoidance has a special priority. Serious harms—death, disability, disease, and the like—compromise a foundational condition of effective human agency. Impairing basic powers of human agency cripples the pursuit of a wide range of human ends and aspirations, and denies normal human lives to those whose powers are impaired. The imposition of physical harm is bad for those harmed no matter what particular aspirations and commitments they happen to have. Matters are different with respect to most benefits. Benefit, like happiness, is mostly for each of us to pursue as best we can. Each of us is presumptively the best judge of our own good and it is independently important that we choose our own good and author our own lives, even if we are not likely to choose as well as some benign despot might. Leading our own lives is an essential aspect of autonomy.

Harm’s special priority—in both our ordinary moral thinking and in our legal system—thus makes sense within a liberal philosophical framework. The question, then, is whether the safety and feasibility norms are plausible articulations of that priority. The burden of this Article has been to show that they are. First, the significance requirement found in both safety and feasibility-based risk regulation is warranted because some harm is unavoidable. The fact that freedom of action and freedom from harm conflict is an intractable feature of the human condition. Some risk of physical harm is the inescapable byproduct of action. The fact that a low level of risk of

184. T.M. Scanlon, *Rights and Interests*, in *ARGUMENTS FOR A BETTER WORLD: ESSAYS IN HONOR OF AMARTYA SEN: VOLUME I: ETHICS, WELFARE, AND MEASUREMENT* 68, 71 (Kaushik Basu & Ravi Kanbur eds., 2009).

devastating injury (the background level of risk) is an inevitable price of activity explains why a significance requirement must be introduced, implicitly or explicitly, into even the most stringent standards of risk regulation. Before we attempt to reduce a risk we must first conclude that it crosses the threshold that separates eliminable risks from ineliminable ones. Without a significance requirement, safety-based risk regulation would be self-defeating. One essential condition for leading a worthwhile life would be destroyed in the name of another essential condition.

From the vantage point of a theory that is concerned with securing for each person the conditions necessary to lead a decent and independent life, safety-based risk regulation is a first-best ideal. If the safety standard were fully realized, every member of society would be in a position to expect that their lives would not be cut short or crippled by devastating injury. Some risk of devastating injury would remain, but the only risks remaining would be those required by the fact that activities as we know them always impose a low but irreducible level of risk of devastating harm. The best reading of our norms of risk regulation does not go quite this far. On that reading the application safety norm is justified when eliminating significant risks of devastating injury does not compromise in a comparable way a condition of human agency which is as important as health or physical integrity. Health is a need, not a want, and it should be compromised only in order to meet another comparably urgent need. From a perspective that takes needs as its touchstone and urgency as its metric of comparison, the stringent “safe level” prescriptions of the Food Quality Protection Act of 1996 are sound in principle. Requiring that tolerances for pesticide residue on food products be set at a level at which, “there is a reasonable certainty that no harm will result from aggregate exposure to the pesticide chemical residue, including all anticipated dietary exposures and all other exposures for which there is reliable information,”¹⁸⁵ even in light of the special susceptibility of infants and children to harm from toxic substances,¹⁸⁶ is eminently reasonable. The harms being guarded against devastate people’s lives. Insisting on this kind of stringent precaution against these harms is reasonable unless attaining this level of safety will impose some burden comparable to a significant risk of devastating physical injury. Depressing agricultural productivity to the point of threatening malnutrition would be a comparable burden.

Feasibility-based regulation of risks of devastating injury replaces safety-based regulation when the burdens of reducing significant risk are

185. 21 U.S.C. § 346a(b)(2)(A)(ii) (2012).

186. *See id.* § 346a(b)(2)(C).

comparable to the risks themselves. When are burdens to major, productive economic activities—the kind governed by both safety- and feasibility-based risk regulation—comparable to significant risks of devastating injury? Feasibility-based risk regulation answers that question by saying that burdens to ordinary, productive economic activities—like milling cotton, refining petroleum, and growing crops—are comparable to significant risks of devastating injury when the burden of the precautions necessary to reduce significant risks to the point of insignificance threaten the long-run flourishing of those activities. Those who depend upon the industries for their livelihoods are likely to lose more from the loss of their jobs than they gain from the elimination of its risks. And the rest of us cannot live without the activities, and must therefore accept their risks. This, too, is a plausible position. And insofar as it is, a reasonable legislature is free to do as Congress has and to enact feasibility-based risk regulation. Cost-benefit analysis is not the only game in town, and cost-justified precaution is not the only plausible standard of precaution.



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