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Human Survival, Risk, and Law: Considering Risk Filters to Replace Cost-Benefit Analysis

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HUMAN SURVIVAL, RISK, AND LAW: CONSIDERING RISK FILTERS TO REPLACE COST-BENEFIT ANALYSIS

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ABSTRACT

Selfish utilitarianism, neo-classical economics, the directive of short-term income maximization, and the decision tool of cost-benefit analysis fail to protect our species from the significant risks of too much consumption, pollution, or population. For a longer-term survival, humanity needs to employ more than cost-justified precaution.

This article argues that, at the global level, and by extension at all levels of government, we need to replace neo-classical economics with filters for safety and feasibility to regulate against significant risk. For significant risks, especially those that are irreversible, we need decision tools that will protect humanity at all scales. This article describes both standards, their operations, and their interoperability. Further, it defends feasible risk reduction as an effective decision and regulatory tool.

INTRODUCTION

Although neo-classical economics and its decision tool, cost-benefit analysis, are widely understood to be inadequate,[1] many have argued that there is no workable alternative.[2] I will show in this

1. *See* FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 68 (2004); Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection,* 150 U. PA. L. REV. 1553, 1557-58 (2002); John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. __ (forthcoming 2016); http://ssrn.com/abstract=2661651 [https://perma.cc/ERZ7-CUDB].

2. *See* MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 4 (2006).

article that there is. I will develop an approach that combines safety analysis with feasibility analysis.

Humanity needs to change the way we process and view significant risk. As the risk of human extinction or collapse, or better, the opportunity of human survival, is considered over time, humanity must continually re-evaluate the risks it faces. We need a risk filtration system. This article argues that humanity's risk filtration system needs to include standards of safety and feasibility for decisions that involve significant risk to the survival of our species.

Functionally, safety analysis reduces risk to the point of insignificance. It may be seen as an affirmative choice such as clean air or clean water. The safe level of risk imposition may also occur at the point where risk is rendered insignificant through feasible risk reduction. I will consider the use of safety-based regulation in the face of irreversible risk, and I will attempt to provide some sense of how that regulation can be used to protect billions of lives.

Where the needs of human liberty conflict with the safety standard, we need another means to reduce risk. Feasibility analysis offers such a method, and it is compatible with the safety standard. Feasibility should be both technological and economic, two separate and distinct operations. I will consider both theoretical and practical applications of feasibility, and I will defend the use of feasible risk reduction.

Jonathan Masur and Eric Posner have strongly criticized feasibility analysis,[3] but I will show how their criticism is unfounded. In justifying their description of feasibility analysis, Masur and Posner claim that in the 1980s and 1990s "the feasibility test had never been given a clear account."[4] By 2003, there had been a clear account by Gregory Keating.[5] Masur and Posner overlook that account and attack early versions of those laws as they were implemented. This article is a defense of Keating's feasibility analysis, as applied to the concept of human survival, against the attack on feasibility analysis

3. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657 (2010).

4. *Id.* at 661.

5. *See* Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653 (2003).

by Masur and Posner. All these authors discuss feasibility analysis as applied to industry.

When one considers the survival of the human species, the merits of feasible risk reduction become more apparent. Keating's work offers and supports a powerful combination of lifesaving and liberty-saving mechanisms that fit well with the current human situation, especially in light of Cass Sunstein's thought-provoking analysis of irreversibility.[6] We need a decision system that forecloses certain risky behaviors.

I begin by thinking about how to assess and confront risk that is both significant and foreseeable. Next, I visit some of the key factors in fashioning appropriate laws and regulations. Part III discusses safety-based regulation with special attention paid to irreversibility, commensurability, and comparability. The fourth pertains to feasible risk reduction, including discussion of feasibility standards, significance of risk, and practical implementation. That part also contains a defense of feasible risk reduction against cost-benefit analysis with an extension to welfarism. I conclude with some observations about the implementation of these risk filters.

I. ASSESSING AND CONFRONTING RISK

Humanity should be creative enough to establish robust models, organizations, regulations, and procedures to cope with and adapt to the variety, depth, breadth, and sheer number of challenges we, as a species, may face. Those models, for some purposes might continue to utilize some form of cost-benefit analysis (CBA).[7] In other situations, CBA may be totally inappropriate. We need to consider other decision filters.

Humanity should consider whether survival requires regulation of risk analysis discounting and even financial discounting.[8] We may

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6. *See* Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227 (2010).

7. Here are some of the many reasons why some would continue to use CBA: 1. The convenience of the unitary metric, 2. The political reality of power politics, or 3. The decision involves no significant risks.

8. Financial discounting has to do with the payment of interest and savings incentives. In contrast, if we were to have a negative interest rate, then we would be penalized for saving. Financial interest rates and financial discounting are to be differentiated from discounting in risk or in feasibility analysis. The time value of

need to regulate discounting in order to discourage planning for a short future. By reducing choice we may be able to minimize dangerous short-term behavior. It may be safest to calculate and promulgate certain maximum and minimum standards.

We need to value both the present and the future. Richard Posner has suggested using negative discount rate to force a longer-term orientation.[9] Such a rate would value the future over the present[10] and could provide a severe brake to use on runaway economic growth. Are there circumstances in which it would be appropriate to use a negative discount rate that way? Or is the use of such a brake too problematic due to side effects?[11] After all, the present is as important as the future. We must not lock ourselves into rigid rules but work for a concerted and cooperative response. In order to better cooperate, we need to increase the number and variety of perspectives.[12]

Humanity needs a clear picture as it assesses and calculates the risks in its future.[13] We must pay attention to science. While we see

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money is decidedly different from the time value of life. As Cass Sunstein points out, human beings cannot be banked; they do not earn interest. *See* Cass R. Sunstein, *Your Money or Your Life*, NEW REPUBLIC, Mar. 15, 2004, at 27, 29 (reviewing FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2004)).

9. *See* RICHARD A. POSNER, CATASTROPHE: RISK AND RESPONSE 152-53 (2004).

10. A negative discount rate would seem to represent a kind of "sacrifice mode."

11. The side effects would be significant and morally problematic if we were to make the death of one person 500 years from now more serious than the death of one person today.

12. This does not justify a short-term increase in human population. However, it does justify wider opportunities for participation in decision-making.

13. As sociologist Niklas Luhmann observes,

> If there are no guaranteed risk-free decisions, one must abandon the hope that more research and more knowledge will permit a shift from risk to security. Practical experience tends to teach us the opposite: the more we know, the better we know what we do not know, and the more elaborate our risk awareness becomes. The more rationally we calculate and the more complex the calculations become, the more aspects come into view involving uncertainty about the future and thus risk. Seen from this point of view, it is no accident that the risk

the problem of risk and survival, how do we analyze it? How do we analyze the unthinkable? Do we hedge? What is acceptable morally? When, from a statistical perspective, would it be best to stop doing what we are doing—or at least slow down—and evaluate the possible or probable impact of humanity's cumulative behavior? After all, we are deep in environmental overshoot[14] and at the same time we are in the process of poisoning ourselves.[15] Richard Falk saw this happening over 40 years ago.[16] Humanity finds its choices becoming increasingly limited. And, as we shall see,[17] the irreversibility of certain risks requires special treatment. We should expect and plan for our own risky behavior.

If the risk of global collapse is one-tenth of one percent per year over the long term, we should nevertheless expend significant resources on prevention. Some risks may cumulate over time. How should we consider the risks? Should we merely place a *value* on them? The question should be how are we to *evaluate* the risks or the rewards. Insurance cannot compensate after the fact for the possible

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> perspective has developed parallel to the growth in scientific specialization.

NIKLAS LUHMANN, RISK: A SOCIOLOGICAL THEORY 28 (Rhodes Barrett trans., de Gruyter, 1993).

14. *See* DONELLA MEADOWS ET AL., LIMITS TO GROWTH: THE 30-YEAR UPDATE 137-39 (2004).

15. *See* Mary Jane Angelo, *Corn, Carbon and Conservation: Rethinking U.S. Agricultural Policy in a Changing Global Environment,* 17 GEO. MASON L. REV. 593, 613, 616-20 (2010); CARL F. CRANOR, LEGALLY POISONED: HOW THE LAW PUTS US AT RISK FROM TOXICANTS 132-77 (2011).

16.

> We are living in a period of constantly increasing risk and diminishing opportunity. To illustrate: as the atmosphere grows more contaminated by a variety of poisons, it becomes ever more difficult to restore conditions of purity. A situation of irreversibility threatens to arise in which no amount of feasible effort can counteract the process of contamination or temperature change.

RICHARD A. FALK, THIS ENDANGERED PLANET: PROSPECTS AND PROPOSALS FOR HUMAN SURVIVAL 8-9 (1971).

17. *See Irreversibility*, *in* The Safe Level of Risk Imposition (III.A) below.

losses. Worrying about dollars can get in the way of doing the right thing. We need to consider what forms of protection are functional and acceptable.

There are professionals who study risk and are employed to provide a form of insurance from catastrophe. For example, public health officials are responsible for disease quarantines and hurricane evacuations. However, the nature of their employment situation leaves them with few incentives to actually call an alert. The odds of disaster could be 10 percent, but the costs of an alarm are high, so high that false alarms are strongly discouraged. The official's risk of job loss is so great that it may seem safer to be quiet and hope. This kind of thinking occurs even when the catastrophe is a known event with a frequency, such as hurricanes.[18]

However, the risks we are considering (too much consumption, pollution, population, or environmental damage) are generally not events, like hurricanes, with a record of frequency. Richard Posner notes that

> it requires more mental effort to act on the basis of probabilities than on the basis of frequencies. Anyone who doubts this will be disabused by reflection on the inability even of experts and responsible officials to take the risk of a 9/11-type terrorist attack seriously until it actually happened, though the risk was well known.[19]

It is quite a challenge for humanity to successfully perceive a risk based on significance and foreseeability, communicate about it, agree on it, consider a range of responses, plan at least one response, implement it, and then successfully overcome the risk in order to survive. Now consider dealing with several of these challenges at once, and you see better what humanity is up against.

Overall, the systemic risk we face, in our financial world, in science, in all of life,[20] is like the tragedy of the commons.[21] No

18. Edward P. Richards, of Louisiana State University, presentation at Penn's Wharton School, Nov. 2006.

19. RICHARD A. POSNER, CATASTROPHE: RISK AND RESPONSE 10 (2004).

20. *See* Miguel A. Centeno et al., *The Emergence of Global Systemic Risk*, 41 ANN. REV. SOC. 65 (2015).

21. *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (1968).

individual market participant has an incentive, absent regulation, to limit risk taking in order to reduce systemic danger to the group.[22] There is a tendency for each decision-maker to be too self-assured, positive, and hopeful.

Even in the insurance industry, of all places, we can be too positive with our outlook and projections. In the 1960s, an actuarial expert discovered that she "couldn't find a single numerical probability of insurance company ruin (namely, negative free capital and surplus) other than in an infinite time span."[23] There is also the more-recent example of the need for the bailout of insurance giant AIG.[24] Presumably most insurance companies don't do this. But when those who protect us merely hope for the best, we are set up for the worst.

Risk enterprises, especially our greatest one, human survival, must attempt to factor in all aspects of the stochastic model or process.[25] Seemingly random risks can affect all systems, even in the ways

22. *See* Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 198 (2008).

23. HILARY L. SEAL, SURVIVAL PROBABILITIES: THE GOAL OF RISK THEORY vii (1978). Seal's work pertains to the survival probabilities of insurance companies. It may serve us well to remember that those companies operate in the real world just like the rest of us.

24. *See* William Greider, *The AIG Bailout Scandal: As Elizabeth Warren's devastating Congressional report reveals, the Federal Reserve used taxpayer money to bail out the insurance giant, instead of forcing the major banks to clean up the mess they helped create,* The Nation (Aug. 6, 2010), http://www.thenation.com/article/aig-bailout-scandal/ [https://perma.cc/4TSQ-L4UM].

25.

> In probability theory, a **stochastic** (/stoʊˈkæstɪk/) **process**, or often **random process**, is a collection of random variables, representing the evolution of some system of random values over time. This is the probabilistic counterpart to a deterministic process (or deterministic system). Instead of describing a process which can only evolve in one way (as in the case, for example, of solutions of an ordinary differential equation), in a stochastic or random process there is some indeterminacy: even if the initial condition (or starting point) is known, there are several (often infinitely many) directions in which the process may evolve.

Stochastic Process, http://en.wikipedia.org/wiki/Stochastic_process [https://perma.cc/TVN7-2SFA].

those systems are constructed and operate. Thus, there is a need for regulation to protect against systemic risk. Although financial systems contain and contribute systemic risks,[26] we should not limit the regulation only to financial systems. We need to cover all forms of systemic risk to humanity.[27] Ultimately, humanity will need to consider its risks and opportunities, such as population, pollution, and consumption—and make informed decisions.

We should not overreact, however, in anticipation of change. As Sir Crispin Tickell points out, we need a clear assessment of risk: "We need to make better use of technology and its myriad applications. We also need to understand the hazards, particularly [with] pollution. Risks are hard to assess. The short term must not be allowed to defeat the long term."[28] There is risk in discounting[29] and in its application to the future.[30] As we need to protect the long term, we may need to cease the practice of discounting.

The problem of risk to human survival did not develop overnight. Our ignorance of risk and, in fact, encouragement of more risk is long-standing. The late Ulrich Beck attributes this to temporal confusion:

> This organized irresponsibility is based fundamentally on a confusion of centuries. The hazards to which we are exposed date from a different century than the promises of security which attempt to subdue them. ... At the threshold of the twenty-first century, the challenges of the age of atomic, genetic and chemical technology are being handled

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26. *See* Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193 (2008).

27. Miguel A. Centeno et al., *The Emergence of Global Systemic Risk*, 41 ANN. REV. SOC. 65 (2015). As we shall see, not all risks qualify for special treatment. Only significant risks qualify. How do we adjust for the insignificant risks that are on their way to becoming significant? We are likely to find that doing so can be part of lightening our footprint.

28. Sir Crispin Tickell, *Environment on the Edge,* 59 MERCER L. REV. 719, 728 (2008).

29. "Discounting is just compound interest in reverse." FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 182 (2004). One gets less by taking her money now as opposed to later (when it would include interest).

30. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. (forthcoming 2016); http://ssrn.com/abstract=2661651, at 43-48, 59-60.

> with concepts and recipes that are derived from early industrial society of the nineteenth and early twentieth centuries.[31]

We need new tools for risk analysis that confront risk in order to save lives.[32] The implementation of new tools may be expensive. However, this does not devolve into a matter of "Your money or your life,"[33] as posited by Cass Sunstein. Certainly this is *not* robbery. We should view humanity's efforts at risk analysis as a matter of cooperation toward a greater common good for humanity.[34]

II. KEY FACTORS IN THIS APPROACH

Although humanity may merit survival, our long-term prospects cannot be assured.[35] We should be flexible enough to perceive changes and respond to them.[36] We need to be more vigilant and look farther ahead as our rate of technological advance increases.

Our laws need to be flexible as well. One cannot anticipate every possible scenario.[37] There must be broader guidelines, and there must be discretion. We have to prepare to be flexible enough to deal with a wide range of significant risk, in different layers, angles, shapes, and sizes. If too specific, law or policy can be insulting and impossible to implement in a broad and equitable manner. As David

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31. ULRICH BECK, WORLD RISK SOCIETY 55 (1999).

32. For example, Carl Cranor suggests a public-health approach with testing and a combination of actions at common law, injunctions, and licenses. CARL F. CRANOR, LEGALLY POISONED: HOW THE LAW PUTS US AT RISK FROM TOXICANTS 178-207 (2011).

33. Cass R. Sunstein, *Your Money or Your Life*, NEW REPUBLIC, Mar. 15, 2004, at 27 (reviewing FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2004)).

34. *See* FRANCIS, LAUDATO SI' 116-17 (2015).

35. *See* Sir Crispin Tickell, *Environment on the Edge*, 59 MERCER L. REV. 719, 730 (2008).

36. "[N]ew knowledge can turn normality into hazards overnight. Nuclear energy and the hole in the ozone layer are prominent examples." ULRICH BECK, WORLD RISK SOCIETY 58 (1999).

37. If we try, we're sure to miss something. As humanity does not get "free do-overs," we should not allow possible risks to be excluded from view.

Skeel and William Stuntz have observed, such a law can invite people to try to break it.[38]

A product of our habit of finding quick political solutions to risk, governmental entities currently legislate numerous "small laws," each in response to a discrete risk.[39] Those laws chip away at our liberty.[40] The dynamics of fear have led to social and legal fragmentation. That fragmentation occurs as we attempt to respond to each particular risk as discovered by our risk society.[41] Interest groups cry out for specialized political solutions. We need to overcome political neuroses[42] and see a way to legislate for greater purposes.

Either we need to be capable and willing to legislate toward greater stability[43] and then toward prompt action, or we need some general policy language to help us process new and unusual risks. Although broader language may contain loopholes, it is worthwhile to remember that broader guidelines and policies demonstrate respect for our judgement, give us responsibility, and therefore are more likely to be followed. We need to balance too much specificity against too much vagueness. We ought to look for ways to

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38. *See* David A. Skeel, Jr. & William J. Stuntz, *Christianity and the (Modest) Rule of Law*, 8 U. PA. J. CONST. L. 809, 838 (2006).

39. See discussion of legal positivism in JEREMY WALDRON, "PARTLY LAWS COMMON TO ALL MANKIND": FOREIGN LAW IN AMERICAN COURTS 68-69 (2012).

40. Here is Australian Sandra Berns's sociological perspective:

> [I]t is important to understand the psychology of risk and the threat nominally political processes aimed at minimising risk (and both inflaming and allaying populist fears) pose to fundamental democratic institutions, including the rule of law. . . . Because the 'prevention of bads' has become an absolute priority, we are often blind to the price to be paid for this priority.

Sandra S. Berns, *Things Fall Apart, the Center Cannot Hold,* 18 GRIFFITH L. REV. 53, 60 (2009).

41. *See id.* at 70-74.

42. *See, e.g.*, Engin F. Isin, *The Neurotic Citizen*, 8 CITIZENSHIP STUDIES 217 (2004).

43. The human situation is currently unstable, and we are not yet in a position to adjust to aim for goals.

encourage creative and positive solutions to risk.[44] We will benefit by an expression of our goal of human survival and by recognizing the earthly limits for consumption, pollution, and population.

Those considerations may not be enough. We also need to protect our liberty, but not at the expense of security, and vice versa. At the same time, we need to distinguish the rationality of the individual from the reasonableness of the group. The thought processes are not identical. The result will lead to social change. Humanity needs social change—with a purpose. These are key factors in adopting new risk filters to screen for significant risk.

A. Liberty versus Security: The Increasing Tradeoff

Humanity is up against a most interesting and contradictory combination of needs. We have two very basic needs. The first is security, freedom from injury and death by the acts of others. Consider these words of John Stuart Mill:

> Security no human being can possibly do without; on it we depend for all our immunity from evil and the whole value of all and every good, beyond the passing moment, since nothing but the gratification of the instant could be of any worth to us if we could be deprived of everything the next instant.[45]

Security is a long-term concern, and it requires a long-term commitment.

The other basic need is liberty. According to USC's Gregory Keating, "Freedom of action matters because there are a wide variety of things worth doing, a large set of values worth realizing. It is therefore important that a diverse range of activities be allowed to flower."[46]

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44. This can remind one of the U.S. Constitution, which is very specific on structure of government, for example, but is malleable and has served so well for so long because it is not too particular and is more about broad values, rights, and limits.

45. JOHN STUART MILL, UTILITARIANISM 53 (Roger Crisp ed., 1998) (1861).

46. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 717 (2003).

We need freedom to put others at some *limited* degree of risk. There are certain actions that we must take as part of life.[47] We cannot entirely eliminate risk. However, we may be able to minimize it to the extent that over time the risks to human survival become less significant. Here is Keating's take on the dilemma:

> When we act we put others at peril, even if only very slightly and even when we act with appropriate caution. If we cannot put others at peril—cannot endanger their security—we cannot act and so cannot pursue our ends and lead our lives. Maximal security extinguishes liberty, and maximal liberty extinguishes security. Yet substantial measures of both liberty and security are essential if we are to have the chance to make our lives answer to our aspirations. Liberty and security are both essential conditions of effective rational agency.[48]

Keating points out that this dilemma resides at the heart of accident law.

That same dilemma[49] also resides at the heart of the law of human survival. Security and liberty do not balance well,[50] but we must take

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47. There are at least two points here. First, protecting liberty may simply be a matter of crimping freedom only where risk reduction is feasible. Secondly, let us here distinguish between freedom to put humanity at risk and the freedom to put the life of an individual at risk. A fully-informed individual may knowingly volunteer for risk in order to receive extra compensation. However, the unwilling individual becomes a victim and a means. As we are all different, each member of humanity is unlikely to volunteer for the same additional risk. Justice requires the exercise of informed choice, whether individually or by the group.

48. *Id.* at 676.

49. An interesting history of the dilemma in the American context may be found in SECURITY V. LIBERTY: CONFLICTS BETWEEN CIVIL LIBERTIES AND NATIONAL SECURITY IN AMERICAN HISTORY (Daniel Farber ed., 2008).

50. If we simply balance liberty with security, we see the likelihood of biases toward more security distorting a delicate and complex balancing process. *See* Oren Gross, *Security vs. Liberty: An Imbalanced Balancing,* DE LEGE: UPPSALA-MINNESOTA COLLOQUIUM: LAW, CULTURE AND VALUES 283 (Mattias Dahlberg ed., 2009), also available at SSRN: http://ssrn.com/abstract=1471634 [https://perma.cc/D7XL-DTP4]. Some security should trump some liberty. In what circumstances? For significant risks to life, liberty should give way to support life. This relates to the ranking of fundamental rights.

both into account.[51] Both liberty and security, according to Keating, "are essential conditions for the pursuit of most of the ends of human beings, especially when we consider ends pursued over the course of a lifetime."[52] Both liberty and security are needed for the life of humanity as well as for the life of the individual. How do we find both in generous and sufficient measure? Over time, as humanity goes further into environmental overshoot, beyond our earthly limits, our available choices in each realm will diminish. There will be more conflict, and we should not be surprised to find that what remains of a safe and happy overlap of security and liberty will diminish as well. Unfortunately, as liberty and security each diminish, each becomes increasingly corrosive to the other.

It should be a goal of our species to increase the overlap, to increase the number and range of our available options that contain healthy measures of both liberty and security. If we can successfully return from overshoot, those choices would stand to increase. By using self control to decrease human population, individual consumption, and waste, and thus decrease scarcity, maybe we can prove William Ophuls and Stephen Boyan wrong when they say, "the golden age of individualism, liberty, and democracy (as those terms are currently understood) is all but over."[53] Each, individualism, liberty, and democracy, may be crimped by limits, physical and moral, but there is no reason to call an end to any of them. Ultimately, humanity may need each—individualism, liberty, and democracy—in order to achieve security.

We can consider liberty or security at the individual level or at the societal level. According to Keating, "questions of individual choice ... differ fundamentally from the parallel questions of social choice. Individual choice is the domain of rationality, whereas social choice is the domain of reasonableness."[54] We analyze choice differently at the societal level.

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51. Consider, for example, farming. Fortunately, we do not need to stop farming. However, we may need to reconsider about how we farm, as, cumulatively, current practices may be too destructive, wasteful, and risky.

52. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 682 (2003).

53. WILLIAM OPHULS & A. STEPHEN BOYAN, JR., ECOLOGY AND THE POLITICS OF SCARCITY REVISITED: THE UNRAVELING OF THE AMERICAN DREAM 192 (1992).

54. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 677 (2003).

B. Rationality and Reasonableness

There is much more freedom and latitude in the rationality of the individual than in the reasonableness of the group. Keating explains: "The canons of rationality ... give wide rein to individual subjectivity and are naturally expressed in the language of efficiency." That is because, individually, we experience our own subjective notions of well-being. We can run risks whenever we decide our expected benefits will be worth our expected cost.[55] But Keating points out that "[i]t is not, however, *reasonable* for people to expose others to risks whenever—by the potential injurer's own criteria of value—the benefits of imposing the risk exceed the burdens of having to bear exposure to it."[56] The case of the Ford Pinto and the cost-benefit analysis that led to fiery deaths proves this view.[57]

Rationality of risk imposition does not guarantee its reasonableness.[58] We value risk differently when we are the source of risk from when others place us at involuntary risk. Therefore, when we consider the risks of human extinction, some of us are likely to find that more risk sources may reside with us than with others. Some rational individual liberties may need to be curtailed or somehow limited as the risks they bear may exceed the point of societal reasonableness.

Notions of comparability[59] can help guide us in the decisions we, as individuals, make when we have an impact on the greater group. We compare the risks. Rationality would have us look only at ourselves. Reasonableness, however, would direct us to make decisions for the common good of the group. The test is different from the rationality test. Individually, we may often choose to risk life and limb, but risking the lives of others on a grand scale is different. Generally, we place value on our diverse activities that do not require us to place life and limb at risk. Everyday there are

55. This is our own individual form of cost-benefit analysis.

56. *Id.*

57. *See id.* at 695-97.

58. For an example of the conflict between rationality and reasonableness, consider the collision between the rationality of the anti-vaccine movement and the reasonable needs of the community for public health. *See, e.g.,* Amy Wallace, *An Epidemic of Fear: One Man's Battle Against the Anti-Vaccine Movement*, 17 WIRED, Nov. 2009, at 128.

59. *See Commensurability and Comparability*, *in* The Safe Level of Risk Imposition (III.C) and *Comparability*, *in* Feasible Risk Reduction (IV.D.1) below.

situations that present us, as individuals, with the opportunity to make judgments of comparability. Keating highlights the conflict of values when the value of the activity is pitted against devastating injury when he notes that such "judgments of comparability are difficult, contestable, and contextual."[60] Such comparability does not involve simple tradeoffs, especially when it comes to fundamental rights. Decisions will not stand up for long if they are based solely on cost. Science tells us we need to reduce some individual liberties,[61] but as those liberties are fundamental rights, we need something more to justify any reduction.

Reducing individual liberties may create new risks and not just lessen them. For example, it matters who winds up with the power. These concerns need to be addressed, but it will be more difficult to do so properly if we are not mindful of the difference between individual rationality and collective reasonableness.

Reducing individual liberties will not be popular unless losses are softened and strong elements of fairness are employed. We may need to reduce normative choices rather than reduce liberties. If we as a group see an end as reasonable, then we can use that consensus, with elements of fairness, to help the human family make individual rational decisions consistent with that reasonable end.

Richard Falk suggests that "A rational use of the resources of the world will have to take account both of the basic needs of mankind and of establishing equilibrium between human consumption and the capacities of nature. Such rationality has profound implications both for resource priorities and for distribution patterns."[62] Rationally, we tend to hate taxes, but if the reasonable policy is to tax consumption, especially consumption beyond a certain point, we as a group may make that choice. One advantage of having steep taxes discourage consumption (or, better, encourage thrift) is that there stands to be a

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60. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 718 (2003).

61. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. (forthcoming 2016); http://ssrn.com/abstract=2661651, at 58.

62. RICHARD A. FALK, THIS ENDANGERED PLANET: PROSPECTS AND PROPOSALS FOR HUMAN SURVIVAL 406 (1971). For more on fairness and distribution, see *Weighing Hardships: Fairness*, *in* Feasible Risk Reduction (IV.D); and *Implementing Welfarism with Feasibility Analysis*, *in* Feasible Risk Reduction (VI.F) both below. This matter also arises in the context of property law.

source of revenue to help with conversion to the most reasonably efficient and safe technology available in such areas as heating, lighting, transportation, etc. The transformation could lead to employment for some and could ultimately be beneficial for all of us. We can employ our rationality to help humanity reach reasonable ends.

Let's consider the reasonableness of the human risk situation. Some may argue that we don't know if there is an imminent risk of extinction or collapse, or whatever might cause such significant risk to ripen. However, with environmental overshoot in mind, each of us can reasonably understand that decisions, or lack thereof, that lead to an increased environmental footprint might theoretically tip the balance of irreversible risk. If such risk were to become reality, there would be a critical event at a critical moment. At the very least, a number of critical events or conditions could push humanity in the direction of extinction or collapse, past the tipping point. We need to bring that theory down to Earth.

The deeper we go into environmental overshoot without making a tactical correction, the greater the risk, no, the danger, of a severe collapse.[63] Even conservative jurist Richard Posner acknowledges that the risks of global catastrophe are "greater and more numerous than is commonly supposed. . . . growing, probably rapidly" and "to a degree, convergent or mutually reinforcing."[64] The possibility of a large drop in food production contemporaneous with resource depletion (or the equivalent due to increased costs of extraction) is real.[65]

If and when such a drop in food production occurs, war will likely follow. *Limits to Growth: The 30-Year Update* (*LTG30*)[66] is optimistic in that it does not take into account the environmental and resource damage associated with war,[67] bearing in mind that the

63. *Id.* at 137-39.

64. RICHARD A. POSNER, CATASTROPHE: RISK AND RESPONSE 245 (2004).

65. The world is headed for hunger in any event. *See* LESTER R. BROWN, FULL PLANET, EMPTY PLATES: THE NEW GEO-POLITICS OF FOOD SCARCITY (2012).

66. DONELLA MEADOWS ET AL., LIMITS TO GROWTH: THE 30-YEAR UPDATE (2004).

67. *Id*. AT 150.

Even just the preparations for war constitute a significant cost and risk. Princeton Professor Richard Falk addressed this forty years ago:

destructiveness of industrial war far exceeds that of earlier generations.[68] And yet, humanity has not changed how it enters into war.[69]

Events at Hiroshima in 1945 and in Vietnam, Iraq, and Afghanistan show no strong war prevention imperative in the nuclear

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> [T]he pressure of competing wants and the actuality of resource shortage cannot sustain the continued misappropriation of resources for the weapons of war. These weapons consume immense quantities of scarce resources and satisfy no constructive human needs. As such, the war system is the most spectacular example of man's inability to put the earth's resources to positive use. The magnitude of wasted resources is one of the *most imperiling* of human patterns.

RICHARD A. FALK, THIS ENDANGERED PLANET: PROSPECTS AND PROPOSALS FOR HUMAN SURVIVAL 62-63 (1971). The destructive nature of war itself magnifies our risk.

68.

> If war were converted into a symbolic test of resolve or strength, rather than as a mobilization of total destructive capabilities, it would not constitute a threat to human survival, nor even a blight on human existence. Many primates establish hierarchy and dominance within their group by symbolic encounters, grimaces, and belligerent postures in which the weaker contestant normally gives way without violence, bloodshed, or death. Medieval notions of chivalry emphasized reliance on symbolic encounters between knights at ritual tournaments, although there were field battles, too, that caused a number of deaths. War as it has developed in the modern world is an extraordinarily expensive, inefficient, and self- destructive method by which to establish relations of hierarchy and dominance among sovereign states.

RICHARD A. FALK, THIS ENDANGERED PLANET: PROSPECTS AND PROPOSALS FOR HUMAN SURVIVAL 272-73 (1971). War is so expensive in its destructiveness that it bears risks for all of humanity. If we can agree on the goal of human survival, it becomes easier to find preferable ways to resolve differences.

69. Consider Hugo Grotius's 1625 complaint of "a lack of restraint in relation to war." HUGO GROTIUS, PROLEGOMENA TO THE LAW OF WAR AND PEACE 21 (Indianapolis; New York: Bobbs-Merrill, Liberal Arts Press Book, 1957). We are not much better now.

age. With few if any exceptions,[70] considering the consequences, modern warfare seems to no longer be reasonable or even rational. In the long run, peace will be necessary for survival, but it is reasonable to believe that we need to do more than work for peace.

C. Social Change

Social change aimed at survival will most likely help in that regard. As we think of doing more to assure survival, it would serve us well to reconsider the behavioral norms of our societies. As we increasingly go digital, our rate of change is increasing. We might need to use that social change to help with survival. Economist John Gowdy notes, "Most of the global changes in the earth's support systems have occurred since World War II." Gowdy identifies "the primary cause" as tremendous growth in global economic output, especially in the north. But there is a flip side: "Economic indicators have shown vigorous growth while most biophysical indicators show an alarming decline. Understanding the conflict between economic and biophysical systems is essential to understanding our present predicament and in finding a way out of it."[71] Gowdy is right. We must make changes in our economic systems—for human survival. We can begin to do that by changing systems of risk regulation. But many other changes are also needed to encourage the survival of the human species. Some of those are social changes.

We cannot merely invent our way out of our human problem. We need social change. It needs to happen in science, religion,[72] and law. That social change cannot come purely from technology. For example, social media, like twitter, can't provide the dare, the risk, the commitment, and the reward that meaningful social change has always required.[73]

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70. One possible exception might be "Just War" theory (*see Just War*, http://en.wikipedia.org/wiki/Just_war [https://perma.cc/8SUP-3MFQ]), but political justifications underlie behavior based on claims to be within the rule. Consider the second U.S. war in Iraq.

71. John M. Gowdy, *Biophysical Limits to Industrialization; Prospects for the Twenty-First Century, in* THE COMING AGE OF SCARCITY; PREVENTING MASS DEATH AND GENOCIDE IN THE TWENTY-FIRST CENTURY 43, 46 (Michael N. Dobkowski & Isidor Wallimann eds., 1998).

72. *See, e.g.*, FRANCIS, LAUDATO SI' 121-48 (2015).

73. *See* Malcolm Gladwell, *Annals of Innovation; Small Change; Why the Revolution Will Not be Tweeted*, NEW YORKER, Oct. 4, 2010, at 42.

Corporations are part of society. They experience and create social change as well. Many Western corporations are changing their approach to environmental protection as part of their implementation of risk management policies. One study found that corporate environmental behavior in economically advantaged democracies cannot be explained purely in terms of instrumental threats and explicit obligations to comply with the law. An increasing incidence of "beyond compliance" corporate behavior can be better explained by looking at the interplay between social pressures and economic constraints—with an eye toward potential future liabilities. Corporate "social license" governs the extent to which a corporation is constrained to meet societal expectations and avoid activities that societies deem unacceptable.[74] Those activities to be avoided often relate to risks. Over time, that social license changes.

We already have a lot of social change. And some of it is already quite positive. Ultimately humanity will need to implement survival of the human species as a goal in social change. We have a long way to go.

Social change is critical, but it cannot happen unless the risks are widely acknowledged, considered, and accepted—and we respond appropriately. However, we may not see[75] or be able to respond to risks which leads to what Judge Posner calls "neglect" of risks. In his view the risks of global catastrophe are real, and neglect of those risks is due to economic, political, and cultural (including religious) factors. Such neglect, according to Posner, is "misguided."[76]

What is needed is not so much a remedy for neglect as a direction and purpose. We need to operationalize ways to find risks at an early stage in their development. We can't deal with risks if we don't know about them. We need education, and it cannot be aimless. A worthwhile aim must be meaningful. Meaningful social change does not happen on its own.

How to make social change happen is an open question. There are as many different answers as there are people on this planet. No

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74. *See* Neil Gunningham et al., *Social License and Environmental Protection: Why Businesses Go Beyond Compliance*, 29 LAW & SOC. INQUIRY 307 (2004).

75. *See How We Perceive Risk*, *in* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. (forthcoming 2016); http://ssrn.com/abstract=2661651, at 24-27.

76. RICHARD A. POSNER, CATASTROPHE: RISK AND RESPONSE 246 (2004).

doubt we need some laws to guide our norms.[77] It may be best to remember the view of Professors Skeel and Stuntz that general principles may be preferable to too specific laws or policies can be insulting, impossible to implement in a broad and equitable manner, and can invite people to try to break them.[78]

Due to these challenges, trying to make the necessary changes through social change alone will be futile. How come? We lack a principle in our law to deal adequately with the size (and nature) of the risks we face.[79] The size of the risks overwhelm our ability to understand and to cope. Our law and our society do not have the ability to deal effectively with risks of this size. However, the problem is not limited to the size of risk.

Sociologist Niklas Luhmann argues that the number and breadth of risk-related problems, many of them contradictory, have come to confuse and overwhelm our collective ability to analyze and then to respond. The complications exceed our social systems' abilities, but what is worse, they are contradictory. As Luhmann notes, "The social system is steering a course in which everything is possible and nothing is attainable any longer—namely, where every change is legitimate, but conflicts by way of realization sooner or later with equally justified counter-positions."[80] The problem of rapidly changing political positions comes as a result of a long series of positivist (political) choices. In the process, we have become disconnected from our historical and moral roots,[81] and given humanity's conflicting interests and goals, we encounter increasing contradictions. Those contradictions can lead to gridlock.[82] Without

77. Certainly social change can be legislatively mandated or even judicially determined (with significant impediments and marginal results). *See, e.g.*, GERALD N. ROSENBERG, THE HOLLOW HOPE: CAN COURTS BRING ABOUT SOCIAL CHANGE? (1991). However, it would be best if members of human society could consciously decide to change rather than have social change forced upon them.

78. *See* David A. Skeel, Jr. & William J. Stuntz, *Christianity and the (Modest) Rule of Law*, 8 U. PA. J. CONST. L. 809, 838 (2006).

79. *See* NIKLAS LUHMANN, A SOCIOLOGICAL THEORY OF LAW 232 (Martin Albrow ed., Elizabeth King & Martin Albrow trans., 1985).

80. *Id.*

81. *See* Harold J. Berman, *Religious Foundations of Law in the West: An Historical Perspective*, 1 J. L. & RELIGION 3, 37-39 (1983).

82. Consider, e.g., the war on drugs, and the increasing concerns about its social and fiscal costs. Consider also those entities that may be deemed too big to fail. We live in gridlock, with no principle in sight for resolution. "The problem resides

a unifying principle or goal, we find more and more fine distinctions and less and less that brings us together.

Gridlock is the inability of groups to agree on what the common good is, let alone how to cooperate to get there. It may manifest itself as political gridlock.[83] Selfishness is one cause.[84] Whether social or political, gridlock will not help humanity succeed. Generally, the law is not equipped to change gridlock. Aside from social change, what is available to help us with this problem in the law?

Let's return to the theory of risk. In consideration of devastating injury and fair precaution, the use of neo-classical economics and its tool, unrestricted cost-benefit analysis, should be curtailed.[85] How should we replace that tool? We need one that affords us more precaution.

As Professor Keating begins to make a moral case for a level of precaution that CBA cannot reach, he identifies four characteristics of relevant risk. First, standards are designed to protect from devastating or life-threatening injury, injury both severe and irreparable. Secondly, the injuries are avoidable. Thirdly, the risks are produced by a category of activity that society requires and cannot generally be avoided. And finally, "the risks governed by these standards are certain to ripen into some incidence of the harms risked."[86] Keating's focus is on industrial accidents and not the ultimate catastrophic risk. Hopefully, and presumably, there is

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in the *mediation of necessarily one-sided innovations with static, rather than dynamic, system situations by aid of adequately abstract categories which are meaningful in the long term.*" NIKLAS LUHMANN, A SOCIOLOGICAL THEORY OF LAW 232 (Martin Albrow ed., Elizabeth King & Martin Albrow trans., 1985). For another perspective of gridlock, see MICHAEL HELLER, THE GRIDLOCK ECONOMY: HOW TOO MUCH OWNERSHIP WRECKS MARKETS, STOPS INNOVATION, AND COSTS LIVES (2008).

83. *See* THOMAS HALE, DAVID HELD, AND KEVIN YOUNG, GRIDLOCK: WHY GLOBAL COOPERATION IS FAILING WHEN WE NEED IT MOST 16 (2013); Michael J. Gerhardt, *Why Gridlock Matters*, 88 NOTRE DAME L. REV. 2107 (2013).

84. *See* Steven Callander & Keith Krehbiel, *Gridlock and Delegation in a Changing World,* 58 AM. J. POL. SCI. 819, 820 (2014).

85. John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. (forthcoming 2016); http://ssrn.com/abstract=2661651, at 64-66.

86. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 665 (2003).

nothing in the realm of survival that would preclude this level of precaution from application to the catastrophic risks we create. New levels of precaution should help us begin to navigate our current social gridlock.

Besides cost justification (which tolerates the most risk), there are at least two other levels of legal risk standards: feasible reduction and safety standards of risk imposition. These well-defined standards, in Keating's view, "identify distinct levels of permissible risk imposition, and they stand in linear, vertical relation to one another."[87] They lock into the same system and work together. We will explore each in greater depth.

III. THE SAFE LEVEL OF RISK IMPOSITION

Let's begin with Professor Keating's description of the safety standard: "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.'"[88] How "significance" is determined will be discussed in greater depth shortly.[89]

The safety-based approach is very close to the simplicity of "better safe than sorry" found in the unmodified form of the precautionary principle. If the safe-level standard is not another version of the precautionary principle, it is the next thing to it.

We in the United States already employ the "safe-level" standard for clean water,[90] clean air,[91] and pure foods. The Food Quality

87. *Id.* at 684.

88. *Id.* at 685.

89. *See Significance of Risk*, *in* Feasible Risk Reduction (IV.B) below.

90. The Clean Water Act was passed in a time of national crisis. The Cuyahoga River had burned in 1969. According to Senator Edmund Muskie:

> The whole intent of the bill is to make a national commitment…. Can we afford clean water? … Can we afford life itself? Those questions were never asked as we destroyed the waters of our nation, and they deserve no answers as we finally move to restore and renew them.

Protection Act of 1996[92] provides a good example. The Act protects the public from unsafe amounts of pesticide that may be present on foods, either fresh or processed. The Act requires that tolerances for pesticides be set at a level that is safe. "Safe" means that "there is 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."[93] What's more, the administrative agency is instructed to set limits to provide "an additional margin of safety" in light of the special susceptibility of infants and children to harm from toxic substances.[94]

> These questions answer themselves. And those who say that raising the amounts of money called for in this legislation may require higher taxes, or that spending this much money may contribute to inflation simply do not understand the language of the crisis.

CWA Leg. Hist. 119, 122.

91. The Clean Air Act of 1970 and the Clean Water Act of 1972

> were drafted with deliberate indifference to any comprehensive cost-benefit analysis that would set their environmental goals alongside economic costs in a single master-currency. Instead, drafters established categorical substantive goals and noneconomic standards. By 1983, all United States waterways should be clean enough for fishing and swimming, and by 1985, all water pollution should have come to an end. As for air pollution, the Clean Air Act directed the Environmental Protection Agency to create uniform national standards for six major criteria pollutants, based on 'public health' rather than cost-benefit analysis.

Jedediah S. Purdy, *The Politics of Nature: Restoring Democracy to Environmental Law,* 119 YALE L. J. 1122, 1181 (2010) (citing BRUCE ACKERMAN ET AL., THE UNCERTAIN SEARCH FOR ENVIRONMENTAL QUALITY 165-207 (1974); 33 U.S.C. §1251(a)(1)-(2); Mary Rose Kornreich, *Setting National Ambient Air Quality Standards*, *in* THE CLEAN AIR ACT HANDBOOK 11, 11-32 (Robert J. Martineau, Jr. & David P. Novello eds., 1998)).

92. Food Quality Protection Act of 1996, Pub. L. No. 104-170, 110 Stat. 1489 (1996).

93. 21 U.S.C. § 346a(b)(2)(A)(ii) (Supp. I 2013).

94. 21 U.S.C. § 346a(b)(2)(C)(ii)(II) (Supp I, 2013).

Similar "safe level" provisions exist within the Clean Air Act Amendments of 1990[95] and within the discharge standards of the Federal Water Pollution Control Act Amendments of 1972.[96] For example, the regulatory aim behind the clean air provisions is to "reduce lifetime excess cancer risks to the individual most exposed to the emissions ... to less than one in one million."[97] Some residual risk can remain after safe-level regulation, but it must be insignificant.[98] However, in this example, once the lifetime risk of cancer crosses the line to exceed one in a million, the risk becomes significant.

The Clean Air Act and the Clean Water Act were passed in the 1970s as national commitments to the health and safety of each and every individual American. Then, in the 1980s, neoclassical economics brought us cost justification. An attack was mounted on the two safety-based acts. As Professor Jedediah Purdy sees it, "Features of the acts that have come in for persistent and cogent criticism, notably their embrace of unattainable goals and relative indifference to cost-benefit accounting, made sense to those who created them because they seemed to fit the statutes' status as national commitments."[99]

According to neo-classical economic analysis, the Clean Air Act should have been a massive failure. There was no weighing of costs

95. *See* 42 U.S.C. § 7412(f)(2)(A) (2012); Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection,* 150 U. PA. L. REV. 1553, 1582 (2002). A true safety-based approach to emissions control could only be fully successful if it were implemented worldwide and not just in individual countries. Consider the problem of regulatory exit.

96. The court in *Hercules, Inc. v. Envtl. Prot. Agency*, 598 F.2d 91 (D.C. Cir. 1978) held that the Federal Water Pollution Control Act Amendments of 1972 "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" providing they offer an 'ample margin of safety to protect public health'" and "'protect against incompletely understood dangers to public health and the environment, in addition to well-known risks." *Id.* at 104, 111.

97. 42 U.S.C. § 7412(f)(2)(A) (2012).

98. How "significance" is determined will be discussed in *Significance of Risk*, *in* Feasible Risk Reduction (IV.B) below.

99. Jedediah S. Purdy, *The Politics of Nature: Restoring Democracy to Environmental Law*, 119 YALE L. J. 1122, 1131 (2010).

and benefits. Yet, when Frank Ackerman and Lisa Heinzerling looked deeper, they found otherwise:

> EPA's retrospective cost-benefit analysis—a giant six-year, peer-reviewed study—found that the Clean Air Act was overwhelmingly beneficial to society. EPA's best estimate of the cumulative value, from 1970 through 1990, of the most easily quantified benefits was more than $20 *trillion*—or more than forty times the total costs imposed on society. As intended, the Clean Air Act made the nation's air dramatically cleaner, with emission reductions as of 1990 ranging from 30 percent for nitrogen oxides, up to 100 percent for lead. As a result, people were dramatically healthier. Most of the benefits of the Act that were quantified in EPA's analysis consisted of avoided deaths attributable to reduced air pollution.[100]

According to Ackerman and Heinzerling, the success of the Clean Air Act proves "that it is sometimes possible to make very good decisions without benefit of intricate economic analysis, and even without attention to market mechanisms."[101] Safety has its place.

And quantification has its place. That place, replete with prices, does not involve placing a quantitative value on the priceless.[102]

A. Irreversibility

There is a connection between the priceless and the irreversible. Cass Sunstein notes the connection in federal legislation: "A number of . . . federal statutes, especially in the context of public health and the environment, specifically refer to irreversible losses and make their prevention a high priority."[103] For example, section 102(c) of

100. FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 206 (2004) (citing EPA, THE BENEFITS AND COSTS OF THE CLEAN AIR ACT, 1970 TO 1990 (Oct. 1997)).

101. *Id.*

102. There needs to be a respect or a deference for the priceless, especially that which involves life, the most sacred of fundamental rights.

103. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 229 (2010) (citing "33 U.S.C. § 2712(j) (making special exception to planning requirement for use of federal resources in a situation requiring action to 'avoid irreversible loss of natural resources'); 42 U.S.C. § 9611(i) (same exception for

the federal National Environmental Policy Act (NEPA) requires agencies to discuss "any irreversible and irretrievable commitments of resources which would be involved" in the implementation of any proposed action.[104] NEPA treats certain natural resources as precious and irreplaceable, at risk from irreversible loss. "The central point of NEPA," writes Sunstein, "is to ensure that government officials give serious consideration to environmental factors before they take action that might threaten the environment." Those factors are taken into account with a potentially "burdensome and costly" *environmental impact statement*. "But when potentially irreversible losses are involved, and when officials cannot specify the magnitude or likelihood of such losses, the public, and those involved in making the ultimate decision, ought to know about them."[105] Laws and procedures can and do recognize a finality embedded in the irreplaceable. Delaying development, consumption, or use, when there is risk of significant irreversible environmental loss, may be an appropriate and reasoned exercise of a safety-based governmental response.

Irreversibility plays an important role in risk analysis, specifically in the moral view of risk. Irreversibility also arises as an issue in safety analysis, otherwise known as the safe level of risk imposition. This analysis takes a different perspective on irreversibility. Unlike other approaches to risk management, the safe level of risk imposition helps us attempt to avoid the irreversible. There are some things in life that we cannot bring back once they are gone—including life itself.

Let's consider this irreversibility that we should seek to avoid. Professor Sunstein identifies two ways to consider the concept of irreversibility: seriousness and sunk costs.

Superfund cleanups); 22 U.S.C. § 2151p-1(c)(2)(A) (requiring President to assist developing countries in a way that responds to 'the irreversible losses associated with forest destruction').")

104. 42 U.S.C. § 4332(C)(v) (2012).

105. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 229 (2010) (citing, Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performance*, 102 COLUM. L. REV. 903 (2002)).

Seriousness carries with it the notion of a loss of awesome finality.[106] The loss of unique assets is serious because it is irreversible.[107] When Sunstein wonders whether there is really a clear separation between the reversible and the irreversible, he finds that "irreversibility is simply an aspect of seriousness."[108] Seriousness, or magnitude of harm,[109] is another way to consider the significance of risk.[110]

But taking life is more than just a matter of seriousness. Sunstein acknowledges the connection between life and irreversibility: "Any death, of any living creature, is irreversible, and what is true for living creatures is true for rocks and refrigerators too; if these are destroyed, they are destroyed forever. And because of the flow of time, every decision is, in an intelligible sense, irreversible."[111] However, Sunstein trivializes life by comparing this most precious attribute[112] to rocks and refrigerators. This approach cannot produce a safe decision filter in the context of human survival.

Irreversibility matters for the risks that are significant, not for the insignificant. However, if individually insignificant risks are cumulative, exponential, or dynamic they may combine to become significant. For example, if we consider the extinction risks of excessive consumption, pollution, and population, the parts of each

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106. Consider that the decision not to preserve a rich reservoir of biodiversity such as the 60 million-year-old Korup forest in Nigeria is irreversible. When we consider these risks through the eyes of Graciela Chichilnisky and Geoffrey Heal we see that "The alteration or destruction of a unique asset of this type has an awesome finality." Graciela Chichilnisky & Geoffrey Heal, *Global Environmental Risks*, 7 J. ECON. PERSP. 65, 76 (1993).

107. A big question is whether humanity can reverse our environmental decline. Is it humanly possible? If it is possible and becomes a matter of will, then the matter of irreversibility may lose seriousness. For now it is not proven. Furthermore, we have no idea of the risks and the costs of attempting to (or failing to) go back and forth between environmental decline and recovery.

Ultimately, we appear to face a conflict — and a choice — between industry which, in its current form, tends to be too big to fail and a natural environment that will fail when industry turns out to be too big.

108. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 234 (2010).

109. *See id.*

110. Sunstein sees this when he recognizes that irreversibility is part of a "Significant Harm Precautionary Principle." *Id.* at 235.

111. *Id.*

112. Life is also the most fundamental of all rights.

risk individually might not be significant. But in combination, the risk may be significant. How do we deal with irreversibility in that context?

Sunstein also addresses the concept of "sunk costs." Bad investments can be irreversible. Once the money is spent, one cannot recover it: "Irreversible investments are sunk costs—those that cannot be recovered."[113] By using the money or item one way, we lose the option to use it another way. The "lost option value is an opportunity cost that must be included as part of the investment."[114] This, according to Sunstein, is the "economic conception of irreversibility."[115] This approach tends to monetize, but it also attempts to characterize that uncertainty involved in choice as an option. Unfortunately, that choice is blind to the significance of risk. Even when risks are all around, Sunstein fails to compare their significance.[116] Significance of risk is not part of option value analysis. Thus, the "option value" approach fails to help us judge the risks. If we consider losing the integrity of the planet's life support system versus losing an economic investment, and both are irreversible, it should be clear which is more likely to be significant for human survival.

In cases where we face irreversibility on all sides, how would Sunstein make decisions? He elaborates on the "option value" approach: "In many settings, it makes sense to pay for an option to avoid a risk of losses that are irreversible in the sense that they cannot be recouped. The amount of the payment depends on the size and nature of the loss if it is irreversible."[117] Interesting proposition. How much would one pay for the option on the ultimate loss of human existence? What is the correct moral value?

Moral values don't seem to count in Cass Sunstein's view of irreversibility. That may be because moral values are immeasurable. Even when it comes to irreversibility, Sunstein's measurement is

113. *Id.* at 236.

114. AVINISH DIXIT & ROBERT PINDYCK, INVESTMENT UNDER UNCERTAINTY 6 (1994).

115. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 236 (2010).

116. *See id.*

117. *Id.* at 244.

distinctly quantitative, along the lines of insurance.[118] His decision procedure would measure irreversible losses against each other by comparing magnitude and probability of relevant effects.[119] As those decisions may involve irreversible significant risks, humanity has reason to slow down. If we are not careful, we may foreclose some very important decisions. Given a foreseeable risk of global collapse,[120] our collective thought process needs to be more sensitive to risk and more deliberate; the moral issues are more difficult than in the past.

Where survival risks are significant, the option value approach, focusing on sunk costs, does not make sense. Arguably, the approach makes sense where risks are small and insignificant.

Sunstein uses a good general example of the problem to explain sunk costs: the economically-oriented regulation designed to reduce greenhouse emissions. If steps are taken to reduce greenhouse gas emissions, capital costs will be incurred, and they cannot be recouped. Sunk costs are a familiar feature of regulation, in the form of mandates that require technological change. We are often dealing, then, with irreversibilities, not irreversibility.[121] Multiple irreversibilities may be a fact of life. We need an effective way to deal with them.

Again, if irreversibility lies on all sides, how are we to make decisions? Certainly, Professor Indur Goklany is correct to observe that the precautionary principle itself, and presumably safety-based regulation as well, are "not exempt from the law of unintended consequences."[122] In the interest of safety, per Goklany, at all times we must be aware of "both sides of the risk ledger."[123]

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118. Insurance would not be appropriate here. With insurance, one should have a properly insurable interest. The moral effects of insurance's quantitative workings are incompatible with one taking out a life policy on just anyone.

119. *Id.*

120. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. __ (forthcoming 2016); http://ssrn.com/abstract=2661651, at 7-22.

121. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 236 (2010).

122. INDUR GOKLANY, THE PRECAUTIONARY PRINCIPLE: A CRITICAL APPRAISAL OF ENVIRONMENTAL RISK ASSESSMENT 94 (2001).

123. *Id.*

If, instead of focusing on smaller risks, we make the decisions aimed toward our own survival, it would seem that we may have to accept some irreversible investment losses in the interest of our own survival. How are those losses to be allocated? Ultimately, the market would spread them. But fairness and distribution controls are likely to be necessary.

Fairness and the protection of regulation go together. When analyzing regulations, as Sunstein does, the economic conception of irreversibility emphasizes the costs of preserving flexibility for our uncertain future. However, we miss the simple, secure, beneficial, and fair idea of "safety first," the very purpose inherent in safety-based regulation.

We are concerned with the irreversible and the incommensurable for things like life itself that have a moral value far exceeding any economic value. Professor Sunstein explains his view of incommensurability in the context of irreversibility of the loss of a pristine area or of a species. When people talk about such a loss, "they do not merely mean that the loss is grave and that it takes a great deal to provide adequate compensation. They mean that what is lost is *incommensurable* — that it is qualitatively distinctive, and when we lose it, we may lose something that is unique."[124] Sunstein notes the qualitative incommensurability. Some things are incomparable and even immeasurable.

We cannot line up all of our goods and values along a single metric. Life is different from liberty, which is different from property. Sunstein sees that life is too complex to be considered only quantitatively: "If we see species, beaches, friendships and children as equivalent to one another, or as equal to some amount of money, we will have an odd and even unrecognizable understanding of all these goods." These goods are priceless and irreplaceable. "When people object to the loss of a species or a beach, and contend that the loss is irreversible, they mean to point to its permanence and to the fact that what has been lost is not valued in the same way or along the same metric as money." [125] Like species, relationships and relatives are not typically expressed in dollar values.

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124. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 237 (2010) (citing Martha N. Nussbaum, *Plato on Incommensurability and Desire*, *in* LOVE'S KNOWLEDGE (1994)).

125. *Id.*

More particularly, Sunstein raises the foreseeable loss of a significant percentage of world species from the warmer temperatures of climate change: "On one view, what makes this loss 'irreversible' is that something qualitatively unique, without real substitutes, will be gone permanently."[126] That qualitatively and physically unique thing may turn out to be the life support system of the planet. Irreversibility, combined with the incommensurable, gives meaning to the goal of human survival.

Consider two conceptions of value: the economic[127] or the quantitative versus the moral or the qualitative. We cannot be both consistent and complete in relying entirely on either one.[128] Sunstein says we should not confuse the two conceptions:

> Of course, people are willing to make trade-offs among qualitatively diverse goods, and they do so all the time. We will pay a certain amount, and no more, to be able to protect [family] members or an endangered species or to visit the beach or to help preserve it in a pristine state; public health problems threaten to cause losses of unique goods, including human lives, but tradeoffs are nonetheless made; we will not pay an infinite sum to see our friends or even to maintain our friendships; we will take some precautions, but not others, to reduce environmental risks to ourselves and to our children. To say that a good is not fungible is not to say that it is infinitely valuable.[129]

Is there anything that is infinitely valuable? Can we say that about human survival? Or is the value of survival debatable? Should it be? A good not being fungible is a far cry from the pricelessness of human existence. Failure of the human species to survive would be irreversible, incommensurable, and repugnant.

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126. *Id.*

127. The economic perspective is essentially utilitarian. *See* Abraham Bell & Gideon Parchomovsky, *A Theory of Property,* 90 CORNELL L. REV. 531, 543 (2005).

128. We can make it even more complicated by adding another conception of value: the aesthetically pleasing.

129. Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 238 (2010).

A brief discussion of distribution is necessary next, as Sunstein addresses it in the context of irreversibility. The combination of irreversibility and incommensurability, in the face of a world of increasing scarcity, sheds a different light on the issue of distribution. Inadequate distribution in such a world, is likely to kill.

Although Sunstein's work is admirable, and it's easy to agree with much of it, his argument that "the analysis of distributional goals must be undertaken separately from the analysis of irreversibility" is flawed. To Sunstein, goods don't pose significant risks, but he does acknowledge potential harm to the poor: "Sometimes we will hurt the least well-off, rather than help them, if we buy an option to preserve our own flexibility. The cost of the option might be paid mostly by those who can least afford it."[130] The option-price approach is focused on the price rather than the risk. Risk analysis that is oriented first toward money is oriented toward property rather than toward life. This is part of the problem.

The other part of the problem involves an inequality in the application of the most fundamental right, the right to life. For the poorest, paying the price of that option may, of scarcity and necessity, be done only with their lives.[131] The price is death to the innocent. The taking of their lives is a significant, irreversible, unfair, and immoral act. If it is done with intent, it represents a criminal violation of the most fundamental human right. If the killing is knowingly statistical, is it much better?

In many ways, for each of us, and in some ways for all of us, safety regulation stands between life and death. The sooner we come to accept this, and the sooner we make the necessary adjustments, the better humanity's chances will be and the fewer lives in being that will be unnecessarily, irreversibly, and painfully lost.

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130. *Id.* at 243.

131. If, when we see ourselves, our children, our friends, our neighbors, each other, all of us, we see the face of God, we must realize that such distributional decisions may involve the sacred and, as a serious violation of principles of fairness, may mean death to the innocent. At some level, then, given the global nature of the risks, we are all potentially "innocent."

B. Safety-Based Regulation

The regulatory nexus of human survival requires both quantitative and the qualitative analysis. Qualitative analysis may need to come first — in the likely form of safety-based regulation.

Safety-based regulation has two defining requirements that, taken together, distinguish it from other means of evaluating and reducing risks. Risks must be significant, and costs must be excluded in order to reduce risks to the point of insignificance. Such regulation would require us to avoid those practices of risk imposition that place lives of the unconsenting at significant risk.[132]

Some might argue that if we share costs, only the treatment of the very gravest of risks can be justified—a most restrictive significance requirement. However, even acknowledging and factoring the mere existence of costs can serve to limit or skew the perspective and interfere with the observation or calculation of risk, thereby constituting its own risk.

Classes of risk may be treated separately and differently from individual instances. "The paradoxical fact that the reasonable course of action for a class of risks may differ from the apparently reasonable course of action for a single risk imposition within that class," Keating notes, "thus explains and justifies the significance requirement."[133] For example, driving one car does not constitute the same significance of risk as driving 100 million.

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132. In some ways, that would argue for the human component, alone, to be considered. However, if regulatory risk analysis segments out only certain perspectives of risk without considering the whole picture, including synergies, the analysis is likely to miss some potentially significant risk.

133. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 707 (2003). He explains the paradox:

> There should be nothing surprising about [the] discrepancy between the reasonable course of action with respect to a single action and the reasonable course of action with respect to a class of such actions. It is as familiar as it is paradoxical. Consider the rationality of smoking cigarettes. If you enjoy smoking cigarettes, it is always rational to smoke any given cigarette. The odds that smoking any one cigarette will kill you are trivial. The odds that habitual smoking will kill you are, by contrast, quite high. If you think the odds of death from habitual smoking are unacceptably high, it is entirely reasonable to

Significance of a risk is one of the keys to determining which risks to regulate with safety-based regulations. Significance distinguishes those risks that may, in aggregation,[134] be avoidable, different from other risks, and subject to regulation, from those risks that are unavoidable or irreducible.[135] Many risks, even in aggregation, are not significant, and safety-based regulation is inappropriate for those risks. "Without the significance requirement," says Keating, "safety-based regulation would require the elimination of every discernable risk of devastating injury. But the elimination of *all* discernable risk requires the elimination of all discernable activity. And the elimination of all discernable activity is a cure worse than the disease it treats."[136] The concern here is the elimination of liberty past the

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> make a habit of never smoking any cigarettes even if you enjoy smoking and even though the odds that any one cigarette will kill you are acceptably low. It is rational to do so not just because smoking is addictive, but also because it is impossible to identify the single cigarette that will kill you.

Id. (citing WARREN S. QUINN, *The Puzzle of the Self-Torturer*, *in* MORALITY AND ACTION 198, 199 (1993)).

134. According to Keating, aggregation is a problem for CBA. Is it a problem here, for safety regulation? Keating addresses the subject of aggregation as a defense to a criticism of his significance argument for safety regulation:

> Unlike the aggregation practiced by cost-benefit analysis—which aggregates qualitatively different costs and benefits *across* different people—the aggregation upon which our argument depends involves only aggregation of costs *within* the same persons. It is the cumulative cost of *each* prospective driver that can rise to comparability with driving's risks of devastating injury. Aggregation *across* persons ignores the distinction between persons and sacrifices some for the benefits of trivial gains to others. Aggregation *within* persons does not suffer from this fault.

Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 708 (2003). Evaluating our own risks and costs internally is different from imposing those risks and costs on others in hope of securing maximum efficiency or maximum societal income.

135. *See id.* at 718.

136. *Id.* at 707-08.

point of significant risk, past the point of lifesaving. The significance requirement is necessary to protect human liberty.[137] Before attempting to reduce a significant risk, we must first conclude that it crosses the threshold that separates eliminable risks from uneliminable ones. A lot of behavior could be eliminated. To counter this, the significance requirement in safety-based risk regulation is there, according to Keating, to assure that the "[o]ne essential condition for leading a worthwhile life—liberty"—is retained.[138]

It can always be argued that in a particular instance, a little extra liberty is needed. Let's say, for example, that we "need" (although hypothetically auto travel has been banned) just one trip with the car. Keating's response to the request for such an exception is found in fairness:

> The fairness of insisting that some precaution be taken depends not so much on the cost of taking that precaution in the case at hand as it does on the cost of taking that precaution in the *class of cases* to which it applies. Practices of risk imposition, not individual instances of risk imposition, are the law's basic unit of analysis. The requirement that like cases be treated alike requires this general focus.[139]

The individual components of aggregate risks must all be treated alike, in the interest of justice.[140]

Where humanity has control over significant risks, justice requires a uniformity of rule and application. Thus, generally, we should bear background risks[141] rather than eliminate them.[142] However, if an

137. Liberty is a fundamental right, subject to ranking below life and above property.

138. *Id.* at 701.

139. *Id.* at 706.

140. The exception that may permit the automobile trip arises where not allowing the trip poses a discernable, significant, and commensurable risk that is at least equal to the one being avoided. What rises to that level? Examples would include trips for certain food and healthcare, that which one cannot live without—and cannot be made with less risk.

141. Background risks are those that occur in nature without any human causation.

asteroid impact is part of our background risk, and we are interested in the survival of humanity, we will be compelled to attempt to avert it.

How our rulemaking treats significant risks is important. We return to the bounds of legislation; we'll see this with both clean water and clean air laws. Each has a regulatory structure. Due to legislation's relative inflexibility, as the underlying situation changes, we can exceed the Earth's limits. And in a fluid situation of global risk, even though regulation may be more flexible than legislation, any regulation may allow action beyond the planet's physical limits. Therefore, in many ways, for legislation and regulation, the issues are the same. In the implementation of safety-based regulation, humanity needs to be at least slightly idealistic or aspirational while attempting to be more clear and precise in measuring the progress.

However, Duke's Jedediah Purdy points out a problem with being too idealistic with safety-based goals. He uses the example of the Clean Water Act's "wildly unrealistic" deadlines for ending all water pollution: "Unreachable standards risked the impression of triviality and farce and, more important for regulators and the regulated, provided little help in navigating the middle ground between the existing and the impossible."[143] Unrealistic goals can result in confusion and loss of respect for the rule and even loss of respect for

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> Eliminating background risk works greater harm to one of the essential conditions of rational agency — the liberty to pursue our diverse aims and aspirations — than bearing background risk works to another essential condition of rational agency — the physical integrity of the person. The costs of eliminating background risk are thus not only comparable to the burdens of living with such risk, they are also plainly greater than the burdens of bearing that risk.

Id. at 710.

143. Jedediah S. Purdy, *The Politics of Nature: Restoring Democracy to Environmental Law*, 119 YALE L. J. 1122, 1181-82 (2010) (citing JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW AND POLICY 127-28 (2003) for unrealistic goals and the complaints and confusion they have occasioned, and section 112 of the Clean Air Act as a specific example. Section 112 directed essentially a safe level of risk imposition in a situation arguably calling for only feasible risk reduction.)

the process. More administrative precision of measurement and flexibility in the design of incentive and rule are called for. As situations change, rules may need to change with, or even ahead of them,[144] in real time.

Still, rules with lofty goals are important. Symbolism in legislation and regulation is important. In the debates on the Clean Air Act, for example, there was, says Purdy, an express need to involve the public in accepting new costs, in reducing consumption, and in taking "independent action to enforce pollution controls." Americans were asked to change the way they thought about their air. There was a need requiring "civic, as well as technological, mobilization." [145] Such a change in thought can be achieved by intention. Goals can be wonderfully worthwhile. But the goals must address significant risks, and the goals must ultimately be reachable. For safety regulation to work, the risks must be eliminable, and we must be able to live without them.

We now use safety-based analysis in limited areas, and we need to expand it. "Safety first" risk analysis appears in the current governance system in construction and heavy manufacturing, inherently dangerous work. Scientific risk assessment is often not part of normal regulatory decision-making. Certainly not at the highest levels. Humanity needs to move risk analysis, safety-based risk analysis questions, decisions, and implementation of measures of worldwide significance to the highest levels of government. Given the significance and irreversibility of risks that foreseeably could affect all of us, why not?

To date, according to Gregory Keating, safety-based regulations have been designed to protect limited populations: "The emphasis on those most exposed to risk or those most susceptible to it—those most disadvantaged by the risks being regulated—is a recurring theme in safety-based regulation."[146] But this practice may not be sufficient in the realm of threats to human survival. How can one limit the emphasis to those most at risk when we are all at risk

144. While rules may change easily to meet reality, principles are another matter. Humanity must use principles to address the most significant risks.

145. Jedediah S. Purdy, *The Politics of Nature: Restoring Democracy to Environmental Law*, 119 YALE L. J. 1122, 1187 (2010) (citing CAA Leg. Hist. 149, 258, 335-36 and *Clean Air and Autos*, N.Y. TIMES, Feb. 12, 1973, at 26).

146. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 686 (2003).

together? Humanity should focus on risks rather than on identifying those at risk. Safety-based regulation can be scaled to face even the greatest risks, and if it is implemented globally, there will be no regulatory exit or free-riding.

C. Commensurability and Comparability

Costs are not always monetary. For safety-based regulation and the underlying theory of the safe level of risk imposition, consideration of costs are excluded entirely. Safety, not efficiency, utility, happiness, or greed, is the prime consideration.[147] The safety considerations that protect life and health are incommensurable with other considerations. Keating highlights the incommensurability by comparing the approaches of CBA and safety-based regulation: "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."[148] Safety is considered exclusively. For significant risks, it is the only consideration because the costs on the other side are not at all commensurable with the life and health safety protects. Life and health are not fungible at some ratio of exchange with liberty or with property.

Efforts to implement a safety system of regulation are sometimes viewed as overly rigid and even Utopian. Holding to a standard of protecting life over liberty and property may be too difficult for many of us. An expectation of perfection may overwhelm. So also might the feeling of incessant obligation. In such situations, according to Professor Carol Rose, "second best may be the best that we can do."[149] However, safety considerations on the road to survival may require better than second best.

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147. "[A] reasonable legislature should reject the central idea of unrestricted cost-benefit analysis — that all goods are commensurable, fungible at some ratio of exchange. Statutes like the Food Quality Protection Act of 1996 reject this idea of universal commensurability. They implicitly single out health for special protection." *Id.* at 719.

148. *Id.* at 709.

149. *See* Carol M. Rose, *The Moral Subject of Property*, 48 WM. & MARY L. REV. 1897, 1926 (2007).

Professor Keating argues that "[w]e should eliminate significant risks of injury when the costs of doing so are *not comparable* to the devastation that significant risks are sure to wreak. This ... suggests a division of labor between safety- and feasibility-based risk regulation."[150] We'll be returning to feasible risk reduction in a moment. The point here is that when one pursues risk reduction to the point of insignificance, issues of incommensurability evaporate. Although it may seem that the costs become comparable, the focus is on risk, not on costs.[151] Once risks to life and health are reduced to the point of insignificance, they may be replaced by considerations of liberty and possibly even by considerations of property—until the point where risk becomes significant again.

As we consider the prospect of human extinction, would the rational person or the reasonable group find any *significant* risk acceptable?[152] They would find that risk acceptable only in the instance where the risks (death or destruction of civilization) are comparable[153] on both sides of the equation.[154] Very few things are comparable to life itself.

Keating says that "[c]omparability is, in fact, at its least problematic when the harm threatened by risk reduction is identical

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150. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 709 (2003) (emphasis added). *See also id.* at 718-19. Both types of risk regulation would also allow for equity-based regulation. *See Implementing Welfarism With Feasibility Analysis*, *in* Feasible Risk Reduction (IV.F) below. There is also the potential for other necessary filters beyond risk and equity.

151. The implementation of safety-based risk regulation does not mean that regulation stops when the costs are too great, though costs are easier to fathom than risk. Costs are not considered until significant risk is eliminated.

152. Significance is not measured. It is qualitative rather than quantitative. *See Significance of Risk*, *in* Feasible Risk Reduction (IV.B) below.

153. "Harms are comparable when they disrupt the lives of those they affect in similarly urgent (or insignificant) ways — when they impair ordinary activities, or the pursuit of rational life plans, in similar ways. Burdens and benefits are comparable when they improve or impair lives in similarly urgent or insignificant ways. . . . [H]arms are comparable when they strike at the preconditions of rational agency in similarly severe (or similarly mild) ways." Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 710 (2003).

154. "Health should only be sacrificed when we stand to gain more of something comparable." *Id.* at 719.

to the harm threatened by the risk at hand."[155] When we weigh life against life, liberty against liberty, or property against property, we approach identity. Some things are qualitatively closer than others. In instances of an identity, it may be appropriate to invoke feasibility analysis (discussed below) instead of the safety standard.

Social and historical considerations have led us to weigh some goods more heavily than others. Keating uses the example of food: "The Food Quality Protection Act of 1996, for example, implicitly rests on the particular, historically contingent claim that more yield per acre of crop planted is not a good comparable to a significant risk of irreparable health injury." We value health over food quantity because, he argues, "health is, for each of us, an essential condition of effective agency whereas the benefits of increasing the yield of the crop per acre are not—for us—measured in the attainment of an equally essential good."[156] Health is the next thing to life itself.

At this time, we in the United States do not value crop per acre, or the amount of available food, more highly than our own health. With increasing demands for ethanol; meat production for omnivores, carnivores, and pets;[157] and grain for export to replace exhausted water supplies in Africa, the Middle East, India, and China, that may change. If humanity ever gets so hungry that we give up health standards, our safety, in order to eat, we are in deep trouble.

The same principle we use for pure food holds true for clean air and water. Our health is at risk. And for the affluent of the global West, the cost of air and water regulatory protection is not

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155. *Id.* at 717. Is human extinction or collapse *"at hand"*? How close does it have to be? If it should be treated as being at hand, how long should we do so? Until we are no longer in environmental overshoot? Or until we have remediated the effects of overshoot? A combination of goals, the goals implicit in a greater goal and information in the form of feedback are likely to be the keys to determining new collective behavioral norms.

156. *Id.* at 719.

157. *See* ROBERT & BRENDA VALE, TIME TO EAT THE DOG?: THE REAL GUIDE TO SUSTAINABLE LIVING (2009); Kate Ravilious, *How Green Is Your Pet?*, 204(2731) NEW SCIENTIST, Oct. 24, 2009, at 46-47. One can only hope that, in American culture anyway, we never get to the point of having to eat even one dog. Population control of domestic animals may turn out to be as necessary and important as any other population control. We love our pets, but many of them have a substantial carbon footprint. In addition, those that are loose or feral have a significant adverse effect on biodiversity. *See* VALE, TIME TO EAT THE DOG? at 234-35.

comparable to the risk to our health from air and water pollution. But in poorer societies, pollution may be an accepted part of daily survival. Keating sees that "[i]t might, for example, be impossible to reduce the risks of air and water pollution to 'insignificance' without seriously impairing the ordinary productive activities which generate such pollution, and that might make those workers most disadvantaged by the pollution worse off rather than better off."[158] We might also begin to see these tradeoffs in the United States if humanity's survival efforts are unsuccessful. These tradeoffs would mean giving up more than just money, giving up other aspects of our health, in order to have air that was somewhat cleaner.[159] Given humanity's trajectory,[160] the longer we wait to explore and address these tradeoffs, the harder these kinds of choices will be.

Different cultures may accept different standards for safety. Notions of commensurability and safety, initially anyway, may vary for different people and societies. But there is also the matter of justice. Our species would benefit by working toward some basic unified conceptions and standards.

IV. FEASIBLE RISK REDUCTION

We turn now to the next safest stop on the spectrum of risk control, the feasibility standard.[161] This standard tolerates less risk than unrestricted CBA, but it allows more than the safety standard. Keating, a proponent of feasibility analysis, states that "Feasibility

158. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 720 (2003). The impossibility of reducing pollution risks to 'insignificance' without seriously impairing the ordinary productive activities that generate such pollution — and thereby making most people worse off rather than better off — is important, especially in greenhouse gas debates.

159. Hypothetically, for example, in order to reduce the amount of carbon in the air, we stop making charcoal. Charcoal, then, is no longer available for water treatment plants. Without a technological replacement for charcoal to purify water for drinking, cholera epidemics resume.

160. *See* DONELLA MEADOWS ET AL., LIMITS TO GROWTH: THE 30-YEAR UPDATE 17-49 (2004).

161. Another name for this approach is "'technology-based' regulation, the essence of which is to require the best available methods of controlling pollution." Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection,* 150 U. PA. L. REV. 1553, 1581-82 (2002).

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, thereby maximizing the benefits of the risky activity at issue." Feasibility analysis allows us to do those things only to the extent that we decide we cannot live without them, even though they may involve significant risks. Necessary liberty is recognized and permitted, but risks are reduced. Some risks may disappear: "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."[162]

Keating points out that "The costs of risk reduction matter, but only to the extent that those costs are sufficient to impair the long-run survival of the risky enterprise." Feasibility analysis enables us to eliminate "[c]ost-justified risks . . . so long as their elimination is compatible with the long-term flourishing of the activity at issue, and significant risks remain only if their elimination would threaten the survival of the activity."[163] The analysis recognizes that some risky activities must continue.

We should want to protect the liberty to engage in certain activities. In cases in which specific activities pose significant life and health risks to the species, feasibility analysis may help us eliminate that risk if humanity can find ways to replace those activities with less risky substitutes. It is not always a bad thing to threaten the survival of an activity. The emphasis, ahead of anything else, needs to be on the reduction of significant risks.

Some activities are inherently unsafe, and we cannot make them safe. Not all activities are worth preserving. Activities that represent an inherently significant risk to human survival and that humanity can live without should be eliminated by the implementation of the safety standard.[164] Other activities cannot be entirely eliminated. At a certain point, demand becomes inelastic. Some risky activities may be necessary for life and health. It is with these issues that humanity should work both to reduce significant risks to the extent feasible and

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162. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 685 (2003).

163. *Id.*

164. An example would be to ban the manufacture of CFCs not just nationally but on a global basis. The logic would be focused purely on safety. A simple calculus would determine that the behavior bears significant risk and that humanity has substitutes or can otherwise do without those activities.

to allow those activities to continue (unless significance of risk increases with duration).

Feasibility analysis requires a series of steps. From a theoretical perspective, first we need to identify significant risks to life and health. Second, we use safety-based regulation to protect those basic things we need for life and health, like clean air, clean water, and safe foods.[165] Third, for remaining risks, we need to analyze the feasibility of reducing those necessary risks without crippling the activity that imposes the risk. Here is Keating's explanation of the operation of feasibility analysis:

> Feasibility . . . has two aspects—*a 'technological' one and an 'economic' one*. Technological feasibility analysis asks 'What is the lowest level of risk technically attainable?' 'How much could we reduce this risk if we single-mindedly set out to reduce it as much as possible?'[166] Economic feasibility analysis asks 'What is the lowest level of risk whose costs can be borne by the activity that imposes the risk at issue?' . . . Feasibility analysis looks to achieve the lowest level of risk practically attainable.[167]

As part of risk analysis, the function of feasibility analysis is to reduce risks to life and health first, and then within those bounds, to maximize liberty of regulated behavior.[168]

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165. This is the first of two safety-based operations. The second occurs when feasible risk reduction successfully frees us from those risks we can live without.

166. "The frontier of technological feasibility is fixed not by the best present practice, but by the engineering practice that might be achieved through a dogged commitment to feasible risk reduction." *Id.* at 688. A reaching aspect is essential, or we risk becoming too complacent.

167. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 687-88 (2003) (emphasis added).

168. For the example that comes to the minds of many, would smoking be banned? To answer that question, we would first need to answer whether smoking, per se, represented a significant risk to human survival. If so, and if there was no way to smoke without creating a significant risk to survival, smoking would need to be eliminated by the safety standard.

Now, let's say that scientists determine 1) that growing tobacco does not automatically represent a risk to an adequate food supply, 2) that the damage to lungs and the resulting costs of health care do not represent a significant risk to the lives of unconsenting others, and 3) that the carbon released in smoking does not

A. Feasibility Standards

Technological feasibility is the first of the two feasibility standards. Technological feasibility requirements reduce permissible risk and exposure levels to new lows. They establish permissible standards and achievable goals within the limits of available time and investment. As technology develops, standards can be adjusted.[169]

The technological feasibility standard can apply to the control of water pollution, air pollution, human population, resource depletion, or any other survival risk that could be reduced through the regulation of the use of technology. The beauty of this standard is that it is clearly workable, because it is currently in use.[170]

Economic feasibility is the other feasibility standard. Although there is a cost aspect to this approach, it does not involve weighing benefits against those costs.[171] According to Keating, "Judgments of

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represent a significant component of the risk of catastrophic climate change. While life and health considerations cause humanity to want to reduce smoking, the liberty interests of smokers require that smoking be allowed while risks are eliminated to the extent technologically and economically feasible. From this analysis, outdoor smoking areas and steep tobacco taxes are predictable.

169. *See id.* at 688-89 (citing opinion of Judge J. Skelly Wright in *United Steelworkers v. Marshall*, 647 F.2d 1189, 1264-66 (D.C. Cir. 1980)).

170. See Occupational Health and Safety Act of 1970 as codified at 29 U.S.C.A. §651(b) (2012) for the "most extensive application and judicial interpretation." *Id.* at 687.

171. Considering the costs is important to economists. Twentieth-century [neo-classical] economists believe it is critical to consider and weigh both costs and benefits:

> [Cost-benefit analysis] is an indispensable step in rational decision making in this as in other areas of government regulation. Effective responses to most catastrophic risks are likely to be extremely costly, and it would be mad to adopt such responses without an effort to estimate the costs and the benefits.

RICHARD A. POSNER, CATASTROPHE: RISK AND RESPONSE 139 (2004).
This feasibility approach considers the costs in a feasibility calculation. However, considering the benefits, placing a value on all human life, present and future, is not only impossible, it's morally repugnant. In addition, per Judge Posner, calculating the risks is impossible. The successful use of CBA in this situation is impossible and unfair. We need other methods to consider and address the risks

economic feasibility require 'cost-assessment,' but they do not require 'cost-benefit analysis' [CBA]. 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."[172] There is no CBA as there is no comparison of the benefit with the cost. In fact, the test has no measure of benefit whatsoever, and, if feasible risk reduction can be accomplished with minimal effort (including changes in technology), there might be no need for cost assessment.

As conceived by Keating as a protection for workers, the economic feasibility question is "whether the industry is able to bear the cost."[173] The economic limits appear to be the point of inelasticity of demand, the point at which consumers "can't do without." That is the point in the demand curve where it becomes steep, where great profit can be reaped. Those activities and goods that people can't live without can have almost infinitely high profit margins. Typically, at that point, almost any costs can be borne.

Feasibility analysis does not measure benefit, which is likely to be a matter of basic survival.[174] Any and all of the various tests for economic feasibility, therefore, would relate to elasticity of demand.[175] In the context of human survival, the protections should go well beyond the workers in an industry.

Nothing prevents the application of both approaches, technological and economic, together, to feasibility analysis. They often are used

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and the costs that trouble Judge Posner and others so much. Use of the feasibility standard is one such approach.

172. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 690 (2003) (citing *Portland Cement Assn. v. Ruckelshaus*, 486 F.2d 375, 387 (D.C. Cir. 1973)); *see also* Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection,* 150 U. PA. L. REV. 1553, 1581-82 (2002).

173. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 691 (2003) (citing *United Steelworkers v. Marshall*, 647 F.2d 1189, 1264 n.102 (D.C. Cir. 1980) (Wright, J.)). This point is explained in *Industrial Union Department, AFL-CIO v. Hodgson*, 499 F. 2d 467 (D.C. Cir. 1974) (addressing the OSHA asbestos standard).

174. Fire engines and ambulances are easy examples. The maintenance of all roads upon which they might run would be a more difficult case.

175. Neither elasticity of demand nor even happiness should determine how to value human life or its life support system. Rather, humanity should attempt to use elasticity of demand as a tool to improve the chances of a long-term human future.

together, and when they do, they are used in the order presented here. This dual approach to feasibility regulation is already in use in the United States.[176] It allows more liberty than a purely technological approach. And yet this treatment serves to reduce, even possibly control,[177] certain risks.

Again, feasible risk reduction does not reduce all risks. It reduces only significant risks as much as possible by finding the amount of risk-producing behavior that humanity cannot live without. Technological goals are considered first, but they are tempered by an economic measurement of humanity's ability to pay.

B. Significance of Risk

Not all risks qualify for feasible risk reduction. As with safety analysis, feasibility analysis requires identification of *significant* risks. Who determines significance? Sequentially, the determination is shaped by legislators, regulators, and judges.

For legislation currently on the books in the United States, significant risks must relate to health or injury. Feasibility or safety analysis could also be used to protect humanity from risks to survival. However, the risks must be significant. According to Keating, "Unless and until such a finding is made, the requirement that the risk be reduced as far as technologically and economically feasible is not triggered."[178] He explains two required aspects of significance: "First, the risk must be salient—it must be distinguishable from other risks associated either with the activity in question or with social life in general. It must stand out among its fellow risks." But there is also concern about the result. "Second, to be significant, when a risk ripens into harm it must inflict a severe

176. See Keating's discussion of Clean Water Act provisions requiring "pollution control to the extent 'technologically and economically achievable.'" Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 690-91 (2003) (quoting *EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 76 n.15, 79, 74 (1980); *Rybacheck v. EPA*, 904 F.2d 1276, 1290-91 (9th Cir. 1990)). To additionally require a cost-benefit comparison would subvert the intended risk reduction of the Act.

177. Imagine applying the regulation somehow as a brake. It must be robust enough to hold up, yet it seems that it must be used in a carefully calculated and predictable manner.

178. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 692-93 (2003).

injury, a devastating injury, the kind of injury that seriously impairs ordinary life."[179] This analysis applied at the group level would involve foreseeable risk of harm to a sufficiently sizeable group.

How can humanity know if a risk is significant? Consider Keating's following analysis with the individual in mind, and then change the focus to humanity as a whole:

> [J]ust how to interpret 'significance' is a difficult question. Is significance a purely quantitative notion? Maybe some numerical threshold combining magnitude and probability? Or is it a more qualitative and contextual judgment, one which depends on the distinctive features of the context in which it arises? Might the numerically same risk of death be significant in the workplace, but trivial in an extreme sport? May risks of equivalent probability and magnitude in one sense—equal risks of death, for example—vary in significance if one way of dying is more widely feared than another?[180]

Risk tolerances vary. The same is likely to hold true in the analysis of risks to human survival.

Although Professors Masur and Posner describe quantification as "magic,"[181] purely quantitative measures cannot capture the notion of significance of risk. For example, in order to count as significant in the 1990 amendments to the Clean Air Act, the risk of injury must pertain only to injuries that are devastating which relies on a qualitative evaluation.[182] That qualitative aspect is one reason why the notion of significance cannot be quantified.

Keating offers another reason why significance eludes purely quantitative measures: "Significant risks are salient ones, and

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179. *Id.* at 690 (citing *Portland Cement Assn. v. Ruckelshaus*, 486 F.2d 375, 387 (D.C. Cir. 1973)).

180. *Id.* at 693.

181. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 700 (2010).

182. *See* Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 694 (2003). That "devastating" standard might not be sufficient to adequately protect the future of humanity.

salience is a matter of standing out."[183] These are problems that deserve and get our attention, if we are not in denial. "Salient risks are prominent ones, risks which jut out in the context of the activity subject to regulatory scrutiny."[184] But salience is only part of the issue of significance. Keating notes that significance also depends upon gravity:

> 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.[185]

In its search for salient risks, humanity may have a whole new use for opinion polling.

By their very nature, threats to human survival, involving too much consumption, too much pollution, too many people, or any combination thereof beyond the limits of the Earth are sufficiently prominent to qualify as salient risks. By their very nature and context (their gravity), magnified by their degree of foreseeability and by overuse of the commons, threats to human survival are to be deemed significant.

1. Rethinking Social Norms

In the face of such significant risks, we need to rethink our social norms. There should be a right against certain involuntarily imposed risks.[186] However, the environmental injunction has not fared well as

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183. *Id.* It would seem that salient risks could be qualitatively or quantitatively salient, conspicuous, or outstanding. This could be a quantitative matter of statistical significance, that usage of the word "significance" bearing one of the many meanings within the concept or notion of significance of risk. Might the use of the term *statistical significance* in statistics benefit by being rethought? Does statistical significance align fully with the qualitative and quantitative significance of risk? In some ways, statistical significance has nothing to do with significance of risk, but the similarity detracts by lending itself to possible confusion between the two.

184. *Id.*

185. *Id.* at 697.

186. *See* John Oberdiek, *Towards A Right Against Risking,* 28 LAW & PHIL. 367 (2009).

a means of protection.[187] Other injunctions against risk may not fare any better. Ultimately, humanity may need equity courts to protect it and its life support system.

Let's say those courts do protect us at some minimal level. Now the questions get harder. To what extent do the courts support the creation of new norms? Does humanity transform its energy systems to use significantly less fossil fuel? What happens to the "Sunday driver"? What happens to the oil dealer? What happens to the coal miner? When it comes to new norms, the questions can get even more difficult.

Here is one of the hardest questions: What happens when the source of the significant risk is embedded in the practices of a religion (not a cult)? The right against risk honors the rights and the integrity of each individual. That right is a moral right.[188] What happens to that right in the face of other fundamental rights, especially the "free exercise" rights of individuals in a religious group that espouses a traditional way of life for its people? There will be a conflict between traditions and new norms.

187.

> Rejecting the idea that environmental violations should give rise to automatic injunctions, the [U.S. Supreme] Court said that an injunction is an equitable remedy, subject to traditional balancing, and that it would 'not lightly assume that Congress has intended to depart from established principles' permitting district courts to exercise their discretion. In a subsequent case, involving the Alaska Native Claims Settlement Act, the Court underlined the point and expressly rejected the presumption of irreparable harm in environmental cases. "This presumption is contrary to traditional equitable principles."

Cass R. Sunstein, *Irreversibility*, 9 LAW, PROBABILITY & RISK 227, 240 (2010) (citing *Weinberger v. Romero-Barcelo*, 456 U.S. 305, 313 (1982) and *quoting Amoco Production Co. v. Village of Gambell*, 480 U.S. 531, 545 (1987)).
Also, as we consider the importance of legal tradition and precedent in the face of potential environmental violations, one can wonder whether traditional equitable principles should give way to the environmental needs of human survival. If so, what of property rights? If not, then through what ways can we support our life support system—and what are the limits and how come?

188. *See id.*

How should humanity determine its degree of precaution? By public ballot?[189] Who should define significance and how? As already noted, the definition begins with legislation. But let's attempt to step further back, to consider the species in its broadest sense—and legislation in its broadest sense. Perhaps humanity would benefit by using a definition with the same general meaning and implementation worldwide. Should this be a matter for a council of religions? The decision would not only impact religion, but all sorts of aspects of culture would be affected. Or should such decisions be a matter for a council of governments? Or both? What does fairness say about how to define the significance of risk to the species? Arguably, humanity should have only one definition.

Implementing the definition of significance may require the flexibility of an independent judiciary. Other branches should also have a role: not only legislative and judicial, but also executive. Why limit such decisionmaking at all? While we may need a structure for decisionmaking at the global level, humanity as a whole needs to be involved. How? Such questions can seem overwhelming.

Perhaps we should focus on responsibilities and goals rather than limits. How should humanity set goals and judge the risks involved in getting there? And how should humanity manage changes coming

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189.

> Invoking the public in the evaluation of new technologies poses many difficulties. It should be understood that the public *will* become involved, politically and economically, as protestors or boosters or customers. However, the involvement is mostly after the technology has become established. The future of the world's people will be shaped by new technologies, but there is usually no opportunity for people to consider which technologies should be promoted, which should be discouraged and how to deal with the consequences and impacts of any particular technology before the impacts occur.

J. Clarence Davies, *From Novel Materials to Next Generation Nanotechnology: A New Approach to Regulating the Products of Nanotechnology*, *in* INTERNATIONAL HANDBOOK ON REGULATING NANOTECHNOLOGIES 545, 551-53 (Graeme A. Hodge et al. eds., 2010). Nanotechnology is unknown territory. We have no means to see the risks. It is likely to be beneficial to slow down and begin to feel our way ahead.

from every direction? Feasibility analysis can help us with such questions.

C. Feasibility Analysis in Practice

The theory of feasible risk reduction is very different from its practical application. Jonathan Masur and Eric Posner[190] are perhaps the strongest opponents because of its numerous practical deficiencies, many attributable to politics. Here, and more deeply below,[191] we will examine the practical use of feasibility analysis and regulation. And we will see how legislative intent to reduce risk can be subverted.

Masur and Posner identify two distinct types of feasible risk reduction regulation. One type focuses purely on technological feasibility.[192] The Occupational Safety and Health Act provides an example of Congress directing the agency to reduce exposure to workplace hazards "to the extent feasible."[193] What may be technologically feasible may not be economically feasible.

The second category requires feasible risk reduction and what the professors characterize as a required comparison of the costs and benefits of risk reduction. Their example is the Toxic Substances Control Act, which directs the Environmental Protection Agency (EPA) to consider "all relevant aspects of the risk . . . and a comparison of the estimated costs of complying with actions taken…."[194] This is not cost-benefit analysis. There is no weighing of the benefits with a unitary metric. This is the economic feasibility standard that we may use when we cannot afford technological risk reduction.

With either feasibility standard, since 1981, if the regulations are major or economically significant, by executive order, President Reagan[195] and his successors through George W. Bush[196] and even

190. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657 (2010).

191. *See (Mis-)Applications of Feasibility Analysis*, *in* Feasible Risk Reduction (IV.C.3) below.

192. *Id.* at 658.

193. 29 U.S.C. § 655(b)(5) (2012).

194. 15 U.S.C. § 2605(c)(1) (2012).

195. Exec. Order No. 12,291, 46 Fed. Reg. 13,193 (Feb. 17, 1981), 3 C.F.R. 127 (1982), reprinted in 5 U.S.C. §601 (1988), revoked by Exec. Order No. 12,866, 3 C.F.R. 638 (1994), reprinted as amended in 5 U.S.C. §601 (2006).

Barack Obama have, through internal review at OIRA,[197] required administrative agencies to use CBA as an evaluation tool. As a result, even when Congress has authorized regulatory action purely for the purpose of safety, the regulations have been reviewed through the neoclassical economic lens of CBA.[198] Given the allure of such a powerful wealth-generating tool, it is no surprise that presidents have continued to implement CBA as a regulatory filter.

Thus, as all regulation is examined with the CBA filter, it is hard to assess feasibility analysis. Even the critics of feasibility analysis, Masur and Posner, claim that critics have never addressed feasibility analysis "on its own terms" and that the test "had never been given a clear account."[199] They see open questions:

> What does it mean to say that an agency must reduce a risk to the point at which 'widespread plant closings' occur? Can this term be given a precise definition? And why exactly are widespread plant closings to be avoided? These

196. Exec. Order 12,886.

197. OIRA stands for the Office of Information and Regulatory Affairs (of the Executive Office of the President). For more on its workings, see Cass R. Sunstein, *The Real World of Cost-Benefit Analysis: Thirty-Six Questions (And Almost as Many Answers*, 114 COLUM. L. REV. 167, 181-88 (2014).

198.

> The executive orders do not require agencies to use CBA in violation of statutory mandates, so their effect has been to more sharply bifurcate agency practice. Agencies applying statutes that permit them to consider costs have, since 1981, applied CBA more rigorously and systematically. Agencies applying statutes that do not permit them to compare costs and benefits, or that permit them to do so in a fashion that falls short of CBA, now report cost-benefit analyses of their regulations, but they do not follow these analyses and instead continue to use feasibility analysis to guide regulatory decisionmaking.

Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 659 (2010).

199. *Id.* at 661.

> questions have not received clear answers, with the result that the debate has proceeded in a cloud of ambiguity.[200]

There may well be ambiguity in current practice. Yet, Masur and Posner treat that ambiguity itself as a flaw in feasibility analysis. The ambiguity stems both from a lack of standards and from legislators using inconsistent language to achieve consensus. Government itself can be a source of risk.

If the government is going to get it right, it will need to use feasibility analysis differently. Consider the spectrum of what humanity has done in practice. Our use of DDT nearly killed off many species of birds. When our skies became black with industrial smoke, it was initially considered a sign of progress. In protecting against life risks, our major emphasis should not reside only in the short term. Easy examples of life risks would include poisoned water or poisoned food. We should extend our concerns to health risks. For example, there are things that merely make us sick, reduce our immunities, slowly poison us, or cause cancer in the long term. What about those longer-term health risks? What about costs? How do we decide which risks are significant and what costs are acceptable? To date, we lack consensus. Governments, like much of human society, are still learning the rudiments of how to deal with risk.

The goals of human survival and reduction of significant risks thereto stand to help us see more clearly and find ways to work together to more effectively address these kinds of questions and concerns. Invoking those goals would involve placing special value on lives in being, on the future of our species, and on humanity having a healthy life support system.

We need the safety standard to protect life and the feasibility standard to protect liberty. To get there—and to defend feasibility regulation—we need to consider the structures and formulations of feasibility analysis—and the assumptions and analysis of critics such as Masur and Posner.

1. General Structure and Formulation of Feasibility Analysis

So how exactly does an administrative agency structure feasibility analysis? Professors Masur and Posner provide the example of the

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200. *Id.*

Occupational Health and Safety Administration's (OSHA's) four-step framework for feasibility analysis. Of course, the framework is limited to OSHA's scope of regulation, workplace safety. The regulatory scope is not as important for purposes here as the steps in the analysis. Here are OSHA's four components to feasibility analysis, as given by Masur and Posner:

> 1. Identify a workplace that is unsafe.
> 2. Define the relevant industry or industries.
> 3. Determine the technologically feasible (that is, available) measures that can reduce or eliminate the risk.
> 4. Require firms in the industry to adopt these measures unless the cost of doing so would cause widespread plant closings or (in OSHA's formulation)
> a. Reduce industry profits by more than ten percent; or
> b. Reduce industry revenues by more than one percent.[201]

The professors characterize step one as straightforward. Similarly, the identification of a significant risk to the species is a starting point. Whether it is an unsafe workplace or a significant risk to human survival, each exercise of feasibility analysis requires an identifiable qualifying risk to start the process. We will return to industry definition and technological feasibility shortly. Importantly, the focus of step four is not on risk control. Its purpose is expressly to protect profits and revenues, potentially at the expense of lives. Masur and Posner rely upon this rather poor example of feasible risk reduction, and then treat problems with the example as an inherent analytic flaw.

In their analysis of its legal background and statutory framework, they explain the roots of feasibility analysis: "The term 'feasibility analysis' derives from the Occupational Safety and Health Act, which instructs OSHA to set the standard 'which most adequately assures, to the extent feasible . . . that no employee will suffer material impairment of health or functional capacity.'"[202] In the

201. *Id.* at 687-88.

202. *Id.* at 663-64 (quoting 29 U.S.C. § 655(b)(5) (2006)). *See* Pub.L. 91-596, § 6, Dec. 29, 1970, 84 Stat. 1593. Generally, feasibility analysis allows an activity to continue with the assurance that material (significant) health impairment will be reduced to the extent feasible, technologically and economically. This results in two questions: 1) Is it possible technologically to reduce the risk? 2) If so does that

context of workplace safety, federal statutes make no mention of compliance costs.[203]

However, the statutory language of feasibility has varied. In the context of environmental protection, Masur and Posner identify several formulations, from clear feasibility analysis to those "more akin to CBA."[204] For example, the Clean Air Act's requirement of the "best available control technology"[205] is designed to achieve the "maximum degree of reduction of each pollutant . . . which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility."[206] The professors note that "while the statute references economic costs, regulation is subject only to the limitation that those reductions be 'achievable.'"[207]

Achievability could include a degree of economic cost anywhere from zero to industry shutdown. Masur and Posner observe that "proponents of feasibility analysis view the principle that regulation must not trigger widespread bankruptcies as a concession to practical economic realities."[208] Unfortunately, such concessions to "economic realities" may well represent significant risk in the context of human survival. Survival will require us to change the way we live,[209] and it may require some bankruptcies.

The professors take note of other formulations such as "reasonably available control measures" (taken to include "reasonably available

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risk prevention curtail the activity economically? Or more precisely, if economic activity is impaired, how much of that economic activity falls safely apart from significant risk? Impact on price or profits is not a consideration.

203. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 663-64 (2010).

204. *Id*. at 664.

205. *Id.* (citing 42 U.S.C. § 7475(a)(4)).

206. 42 U.S.C. § 7479(3) (2006).

207. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 665 (2010).

208. *Id.* (citing 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, 10 (2005)).

209. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. __ (forthcoming 2016); http://ssrn.com/abstract=2661651, at 18.

control technology")[210] and "best practicable" technology[211] as found in various provisions of the Clean Air Act and the Clean Water Act. However, as they observe, when Congress passed the Clean Water Act, the "best practicable" language was supplemented with a directive that the EPA

> consider "the total cost of application of technology *in relation to* the effluent reduction benefits to be achieved from such application." Another section of the Clean Water Act directs EPA to "require application of the *best conventional* pollutant control technology," and in so doing to 'include consideration of the reasonableness of the relationship between the costs of attaining a reduction in effluents and the effluent reduction benefits derived."[212]

Masur and Posner see that the Act's admonition to "consider the reasonableness of the relationship between costs and benefits" when choosing the "best practicable" technology is "best understood as calling for CBA."[213] That is a reasonable interpretation. All the variations make it easy to conclude that Congress has been creatively inconsistent in the language of its legislative requirements for the regulation of risk.

2. Modification of Feasibility Regulations

However, Congress is not the only group involved here. Once enabling legislation has become law, the administration gets involved in two different ways. First, an administrative agency crafts a proposed rule based on the enabling legislation. Then in the executive branch's review of that rule, within the rule-making

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210. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 666 (2010) (quoting 42 U.S.C. § 7502(c)(1)).

211. *Id.* (quoting 33 U.S.C. § 1311(b)(1)(A)(i)).

212. *Id.* (quoting 33 U.S.C. § 1314(b)(1)(B) (emphasis added by Masur & Posner); 33 U.S.C. § 1311(b)(2)(E) (emphasis added ditto) (regulating the emission of pollutants classified as biological oxygen demanding, suspended solids, fecal coliform, and pH); 33 U.S.C. § 1314(b)(4)(B) (detailing factors to consider when establishing the 'best conventional pollutant control technology measures and practices')).

213. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 666 (2010).

process itself, there is a second action that is not part of feasibility analysis as presented by the professors. The Office of Information and Regulatory Affairs, by executive order, imposes an entirely new and different style of legal restraint on all economically significant administrative agency regulations—in a manner that, according to Masur and Posner, is itself beyond review.[214]

One effect of the executive order is to pressure agencies to engage in CBA even where that language does not appear in the enabling statute. Even though the legislation authorizes a regulatory standard such as feasible risk reduction, agencies also know that they will be required to pass a CBA test. Such interpretive freedom is allowed under the Supreme Court's *Chevron* deference standard.[215] As a result, feasible risk reduction analysis tends to get implemented as such only where Congress's language is narrow and specifically calls for that standard alone, and not in conjunction with any other standard.

Effectively, to some degree, the executive order overrides statutory mandates, but the nature of the executive order defies litigation. No one has standing to sue over the internal workings of government. Yet the action affects how the United States governs. Protective rules get watered down through the use of CBA, and the implementation of the Executive Order adversely affects our collective and individual risk profiles.

214.

> Under Executive Order 12,886, each federal agency must conduct a cost-benefit analysis of any proposed regulation with an expected economic impact greater than $100 million. These cost-benefit analyses are reviewed by the Office of Information and Regulatory Affairs (OIRA), which has the authority to reject the regulation or return it to the agency for further consideration. However, this constraint is entirely internal to the administration: no outside group can sue an agency for failing to comply with an executive order, and of course no executive order can override a statutory mandate.

Id. at 667 (citing Exec. Order 12,866 § 6(a)(3)(C); § 3(f)(1); § 6(b) (1993)).

215. *See id.* at 668 (citing *Chevron U.S.A. Inc. v. NRDC*, 467 U.S. 837, 865-66 (1984)).

In the analysis by Masur and Posner, two important conclusions emerge: 1) "the federal courts—led by the Supreme Court—will not force agencies to use cost benefit analysis in regulating when the governing statute appears to trigger feasibility analysis" and 2) "the EPA – and likely OSHA as well – is permitted to employ cost-benefit analysis in lieu of feasibility analysis as an exercise of its discretion under *Chevron*."[216] The Supreme Court of the United States allows agencies to substitute CBA for feasibility analysis even where the statutory language has a strict requirement of technological feasibility ("best technology available").[217]

The Supreme Court's implementation of the feasibility rule undermines the rule. To allow the substitution of a money-oriented rule, where a risk-oriented rule is required by statute, in the name of reasonable agency discretion, holds the potential to replace Congressional measures of safety with executive and administrative measures of selfishness. But this is what the courts are doing.

Masur and Posner's principal argument is that administrative agencies should, when given the choice, prefer CBA to feasibility analysis.[218] Effectively, they favor using modified risk analysis to maximize profits. However, when feasibility analysis is mandated by law, it is not optional. Risk analysis requires risk measurement and likely some degree of risk control, but risk analysis *per se* does not require or even involve profit maximization. Now let's look more deeply into the professors' view of the practical application of feasibility analysis, to see their notion of risk reduction in action.

3. (Mis-)Applications of Feasibility Analysis

The way feasibility analysis is interpreted by administrative agencies, from the standpoint of risk reduction, gets even worse. Feasible risk reduction is conducted with technological and economic analyses and without a comparison of costs and benefits. It is worthwhile to take a look at Masur and Posner's example of the Occupational Safety and Health Administration (OSHA).

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216. *Id.* at 669.

217. *Id.* (quoting *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498, 1505, 1510 (2009) (interpreting 33 U.S.C. § 1326(b))).

218. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 670 n.62 (2010).

OSHA analyzed its own regulation of hexavalent chromium,[219] a compound that has been linked to cancer and other diseases that take 250 lives annually. As part of compliance with Executive Order 12,866, the agency conducted cost-benefit analysis.[220] Afterwards, it conducted a feasibility analysis. Masur and Posner describe the agency's approach:

> OSHA policy required that in order for a regulation to be considered economically feasible—in the sense of avoiding widespread plant closings—it must not cause revenue within an industry to decline by more than 1 percent or profits to decline by more than 10 percent. . . . However, OSHA reserved the right to except industries from this standard under certain circumstances—to impose regulations even though projected revenue or profit declines would exceed the 1 percent/10 percent thresholds.[221]

This is not feasible risk reduction, or even merely the component of economically feasible risk reduction. This is merely one agency's *ad hoc* interpretation of economic feasibility.[222] In these cases, the rule was likely promulgated more as a matter of political feasibility than as a matter of feasible risk reduction.

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219. Cr (VI), is a predominantly manmade compound, used in approximately thirty major industries, that is known to cause lung cancer in addition to lesser ailments such as asthma, dermatitis, nasal irritation, and gastrointestinal ulcers. *See* 71 Fed. Reg. 10,100; 10,104; 10,108; 10,166; and 10,174 (Feb. 28, 2006).

220. In non-fatal cases, values were placed somewhere between the cost of treating the induced cancers and the best estimate of willingness to pay to avoid a nonfatal case. Then they were discounted at either three percent or seven percent annually. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 672 (2010). The range of results was wide. *See id.* at 673-74. Through this analysis, the most stringent feasible regulatory standard was "not cost-benefit justified under any set of assumptions." *Id.* at 674.

221. *Id.* at 675 (citing Office of Safety and Health Administration, Occupational Exposure to Hexavalent Chromium, 71 Fed Reg 10,100, 10,299-300 (Feb. 28, 2006)).

222. Someone has to set the standards of risk reduction. Who should? The standards need to be organized and established at a level that matches the level of the risk. Global risk should require global standards. Ad hoc standards of risk reduction, providing for lower levels of protection, are subject to question.

Masur and Posner draw several conclusions from OSHA's approach to feasibility analysis. First, they regard 1%/10% as the general rule. However, they find a dozen instances in which OSHA overrode its rule in favor of expected profit losses in excess of 20 percent.[223] They cite this agency deviation from its own stated standard as the first of three arguments against feasibility analysis, as implemented by OSHA.

The problem, however, is not OSHA's reliance on the feasibility rule; the problem is OSHA's variable implementation of the rule. The statute requires feasible risk reduction, not CBA. If risk reduction varied based on the implementation of a principle and not on politics, there might be less to argue about.[224] Could humanity's collective safety, as scientifically diagnosed, constitute such a principle? Is our collective safety worth it?

Secondly, Masur and Posner claim that "OSHA's exceptions to the 1 percent/10 percent rule are neither well reasoned nor well documented."[225] Again, this objection pertains to a matter of implementation, not principle. As they note, "On the whole, OSHA's exceptions have the air of post hoc rationalizations: having decided to regulate, OSHA appears to have simply done the paperwork necessary to clear a few formal obstacles."[226] Was the arbitrariness of OSHA attributable to a failure to perform technological feasibility analysis first? Even if technological feasibility was analyzed first, economic feasibility should not be equated with political ends. The politics of selfishness can be powerful, resulting in a distortion away from safety.

The professors' third and final objection to the way OSHA handled the regulation of hexavalent chromium pertains to the possibility that OSHA's feasibility analysis may have led to a suboptimal level of regulation, not just suboptimal from the standpoint of maximizing profits, but suboptimal from a social welfare perspective.[227] A more

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223. *See id.* at 679.

224. Note that feasibility analysis allows for acceptable costs to vary.

225. *Id*.

226. *Id.*

227. How does social welfare theory match up with the ranking of the fundamental rights of life, liberty, and property? Do measurements of social welfare simply represent a cumulative quantitative measurement? To what extent is there a *qualitative* aspect to social welfare theory? To what extent should they take into account the welfare of the group?

protective regulatory standard was abandoned by OSHA in an apparent attempt to save at least one particular industry.[228] This misapplication of feasibility analysis emphasized protecting current jobs rather than continued production subject to feasible risk reduction within a scientifically-determined level of safety from significant risks.[229] Masur and Posner observe that there is no express basis given for the agency decision, and this in itself is problematic. It is difficult to know what is optimal[230] when the analysis has been misapplied.

Masur and Posner also examine paper mill regulation by the EPA. Here, the EPA used cost-benefit analysis to analyze feasible risk reduction.[231] In this application, CBA problematically takes into account only certain[232] human lives lost only in a limited, direct context. CBA takes no account of the damage different approaches to papermaking will inflict on our life support system, which is part of the reason CBA seems to be so cost effective, easy, and preferable. Some of the more difficult to calculate and expensive (even priceless) parts of our existence, resources (such as clean air and clean water) affected by those things known in economics as externalities, tend to get ignored.

The EPA also proceeded with its feasibility analysis regarding the removal of chlorine as part of paper mill regulation. After examining possible mill closures, job loss, and bankruptcies of firms, it considered three alternative regulatory schemes and chose the least expensive in terms of annualized and net costs, job losses, and firm failures.

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228. *See id.* at 680. Part of the problem here may be a matter of industry definition. We'll see that shortly.

229. This is about implementation, not feasibility analysis itself. If the implementation had strictly followed feasible risk reduction procedures, would the result have been better? Better from who's perspective? Economists? Business owners? Investors? Workers? Consumers? The human species? Perspective matters.

230. Optimality depends on the values we accept. In any event, true optimality is never achievable. But paying attention to the values we accept is achievable.

231. *See id.* at 687.

232. Some people don't count. For example, the United States routinely values foreign lives at zero, by failing to consider them in decisions to regulate. *See* Arden Rowell & Lesley Wexler, *Valuing Foreign Lives*, 48 GA. L. REV. 499, 528 (2014).

Masur and Posner find the EPA decision-making process ambiguous, puzzling, and not well explained. But one of their conclusions is that, "*losses to consumer welfare* do not play a role in the test."[233] They are correct. Consumer welfare can be defined any number of ways. Generally, in economics, it gets translated into a unitary metric, usually a unit of currency. A single metric cannot capture the preciousness of life.

However, in feasibility analysis, there is no need to translate into a unitary metric. The analysis, instead, focuses on the matter of risk reduction. Such protection might best be a matter of licensing certain amounts (within limits) of certain kinds of activities, especially those involving significant risk. In the face of significant risks to human survival, how much should consumer welfare count and how?

Masur and Posner are correct to see the economic consequences of feasible risk reduction. Those economic consequences may involve significant sacrifice. The question is whether to worry about money or safety first. Granted, a certain amount of money is necessary for safety. But science now indicates that certain actions in support of safety may be necessary for the very existence of our species.

How should humanity go about securing that safety? Notions and measurements of consumer welfare must include considerations of health and safety. That will require us to change the way we look at and interact with the Earth, our only home. Our focus on efficiency and profit in our limited world, where we are already operating beyond the limits, is not sustainable. Maybe human existence should not be quite so convenient and efficient.

We need to think about our situation as a longer-term endurance effort. We must start to determine which things we cannot live without. This could involve the use of tremendous willpower, and that could prove to be tiresome.[234] However, Lee Anne Fennell, also

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233. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 687 (2010) (*emphasis added*).

234. "[I]n the short run at least, willpower works like a muscle that can become fatigued with use." Lee Anne Fennell, *Willpower Taxes*, 99 GEO. L.J. 1371, 1390 (2011) (citing Roy F. Baumeister et al., *Ego Depletion: Is the Active Self a Limited Resource?* 74 J. PERSONALITY & SOC. PSYCH. 1252, 1255-56 (1998); Martin S. Hagger et al., *Ego Depletion and the Strength Model of Self-Control: A Meta-Analysis*, 136 PSYCH. BULL. 495 (2010) (providing a meta-analysis of studies); Mark Muraven et al., *Self-Control as Limited Resource: Regulatory Depletion Patterns*, 74 J. PERSONALITY & SOC. PSYCHOL. 774 (1998)).

of the University of Chicago, notes the flip side: "Muscles not only become tired but can also get stronger with regular use; these same characteristics apply to willpower. If exerting willpower makes one better at it, then efforts to avoid temptations altogether may prove counterproductive."[235]

There may be significant rewards for using economic willpower to reduce demand, as the reduction of demand would help humanity build up its "economic muscles"[236] and make humanity leaner. Making that change would also help with transition to a different level of consumption for purposes of sustainability.

Let's return to our applications of feasibility. We need to more closely examine the three steps in the process of feasibility analysis as identified and developed by Masur and Posner. Industry definition precedes the two types of feasibility analysis.

a. Industry Definition

Industry definition is the drawing of lines for purposes of regulation. The drawing of such lines is, in and of itself, a political act. If your company is not included in an industry definition, its relevant actions are not regulated. Thus, the slices of the pie are regulated, but the entire pie is not. This spotty regulation not only happens at the local, state, and national level, within countries, but those slices of state and national regulation appear even thinner, more granular, or less important if the view is global.

Industry definition is a regulatory construct. Its focus is on the industry being regulated as opposed to the activity that bears significant risks. However, elasticity of demand and industry

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235. Lee Anne Fennell, *Willpower Taxes*, 99 GEO. L.J. 1371, 1392 (2011) (citing George Loewenstein, *Willpower: A Decision-Theorist's Perspective*, 19 L. & PHIL. 51, 56-57 (2000); Emre Ozdenoren et al., *Willpower and the Optimal Control of Visceral Urges* 20-22 (Resources for the Future Discussion, Working Paper No. 10-35, 2010), *available at* http://ssrn.com/abstract=1635350; and Siegfried Dewitte et al., *Self-Regulation Enhances Self-Regulation in Subsequent Consumer Decisions Involving Similar Response Conflicts*, 36 J. CONSUMER RES. 394, 396, 403 (2009) (questioning the muscle metaphor's assumption that self-control resources cannot be enhanced in the short run and suggesting that task similarity can produce short-run enhancements rather than depletions)).

236. *See* Siegfried Dewitte et al., *Self-Regulation Enhances Self-Regulation in Subsequent Consumer Decisions Involving Similar Response Conflicts*, 36 J. CONSUMER RES. 394 (2009).

definition are linked in current versions of feasibility analysis.[237] Industries that produce highly profitable goods for which there is great demand may receive special protection, exemption from stringent regulation, or a reduction in administrative agency enforcement.

Masur and Posner acknowledge that industry definition is problematic: "Industries do not come in natural kinds. Any industry can be subdivided indefinitely."[238] They see that when the purposes of special industry definitions are merely to "game" feasibility analysis there may be a safety problem worthy of special attention.[239] Administrative agency tinkering with industry definitions and classifications is not so much consistent with protecting health as with protecting corporate profits.[240]

One way to manipulate economic feasibility is to consider the worst economic case and to lobby based on that case: "Infeasibility in one industry may act as an effective veto of regulation of other industries."[241] Another is through varying regulatory treatments among different industries engaging in the same risky behavior, when firms hide behind industry definitions. Humanity is likely to be better off without industry definitions when it comes to regulating significant survival risks. Our risks may be more attributable to and identifiable with behaviors than with products. Regulations that are activity-focused, or possibly result-focused, are more likely to lead to successful risk reduction than industry-focused regulation.

The use of industry definitions does nothing in and of itself to taint feasibility analysis. However, the *misuse* of those definitions, in the interest of production and profit, can taint the results.

Thus, industry definition, the first step in regulating against risk that may be feasibly reduced, is likely to be not only unnecessary but

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237. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 688 (2010).

238. *Id.* at 689.

239. *See id.* at 688-91.

240. The artificial definition of industries in the regulatory context is not terribly unlike the artificial definition of markets in the context of competition law. At least some of the arguments against market definition appear to apply to industry definition. *See* Louis Kaplow, *Why (Ever) Define Markets?*, 124 HARV. L. REV. 437 (2010).

241. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 691 (2010).

misleading and inappropriate. Industry definition can allow feasible risk reduction to give us a false sense of safety. We need to be concerned with the behavior—and the extent to which we cannot live without it.

b. Technological Feasibility

Technological feasibility is the primary tool of risk reduction in feasibility-based regulation. "Technological feasibility generally means technological availability."[242] But humans are creative, and with incentives, technology can change for the better. Masur and Posner point to one of the claims in favor of feasibility analysis—that such regulation can be used to encourage the improvement of technology—and they say that claim is largely empty: "Although some commentators believe that agencies may issue 'technology-forcing' regulations—regulations that oblige firms to develop new, more effective technologies—in practice courts have placed a heavy burden on agencies to prove that such technologies can indeed be developed, and as a result agencies rarely issue technology-forcing regulations."[243] By refusing to enforce technology-forcing regulations, the courts are undermining the very feasibility regulations that they are charged with enforcing.[244] This is not a flaw in feasibility analysis, but a flaw in its implementation.

The professors see other incentive problems, including a lack of adequate incentives to change and a lack of adequate incentives to account for the costs firms impose on third parties.[245] These

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242. *Id.*

243. *Id.* at 691-92 (citing 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, 13-15 (2005)).

244. Courts are backward looking, focused on precedent. Many regulations are forward-looking, designed for the sake of protection. This difference could be used to justify courts allowing a great deal of administrative agency deference.

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> The effect of the technological feasibility condition is not only to protect firms from regulations that might drive them out of business (because they cannot develop a new technology in cost-justified fashion), but also to entrench old technologies. Although feasibility analysis does not eliminate firms' existing incentives to develop safety

incentive problems crop up when there is no consistent social goal. A unified goal, such as survival of the species, should stand to satisfy these concerns. Furthermore, these are not flaws in the analysis itself so much as problems of human motivation. These problems need to be solved separately. They do not constitute a bar to feasible risk reduction.

c. Economic Feasibility

Economic feasibility is about whether humanity can have the liberty to engage in certain behavior—as safely as possible. The economic feasibility test is not about revenues and profits or about job losses. In its full form, this step requires a prior determination of technological feasibility of risk reduction. Then it determines the extent to which that risk reduction is also economically feasible.

By worrying about investors and other industry stakeholders—and not about more significant risks—in low-demand (economically elastic) activities, however, Jonathan Masur and Eric Posner demonstrate a preference for an efficiency geared to economic gain rather than efficiency geared to using less. Their concern is misplaced. To be sure, job losses, plant closures, and investment losses may occur.[246] Those ramifications are serious and important. There are hardships, and they must be weighed against humanity's need to respond to significant risks.

D. Weighing Hardships (Comparative Significance)

Because the feasibility regulatory scheme was designed to protect certain industrial workers exposed to significant workplace risk, the weighing process has involved comparing the hardship of shutting

> precautions that are cheaper than, but just as effective as, existing safety precautions, it does not enhance these incentives. The reason is that feasibility analysis gives firms no incentive to take into account the costs they impose on third parties. In fact, firms have incentives to avoid developing new technologies. Newer, more effective technologies might make otherwise infeasible regulations feasible, allowing agencies to impose additional regulation.

Id. at 692-93.

246. *See id.* at 695-96.

down certain activities to the hardship of the risks exposed by those activities on the workers themselves.[247] When we apply a similar regulatory scheme to the protection of humanity, we look instead at the risk to the species from significant risks caused by certain activity.

The feasibility standard aims to reduce risk and, for those activities we cannot live without, reduce risk without the complete cessation of those activities. Feasible risk reduction also aims at lifesaving – to the extent feasible. The feasible risk reduction approach is consistent with both the preservation of liberty and the preservation of a future for the human species, as it attempts to find the overlap between the two goals.

When would shutting down a major productive activity work a greater hardship upon all of us than would bearing the significant risks of those activities? We can answer: When shutting down the activity would impair humanity's ability to survive more than bearing the activities' significant risk to survival would. When shutting down the activity would make us all worse off, not better off, over the long run. Think of the weighing within CBA and note how different feasibility analysis is in comparison. According to Keating,

> [Feasibility analysis] 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 activity is a cure worse than the disease.[248]

Is shutting down all of certain types of activity ever justified? Masur and Posner's attack on feasibility analysis would have us make "a concession to practical economic realities."[249] However, the

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247. *See* Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 722 (2003).

248. *Id.*

249. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 665 (2010) (citing *Union Electric Co. v. E.P.A.*, 427 U.S. 246, 265 & n 14 (1976); *AFL-CIO v. Brennan*, 530 F.2d 109, 118 n.26, 121 (3d Cir. 1975); 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, 10 (2005)).

economic values of the neo-classical economist may not be the right ones to ensure a future for humanity.

Looking at the problem another way, we can ask whether there is a cure worse than possible human extinction. Since nothing is comparable to or worse than human extinction, do we have to stop all activities that pose a significant risk to survival? How would stopping those activities change our way of life? Presumably, we are smart enough to figure out a more effective answer to our collective risk challenges than to go back to the Stone Age.

Weighing the hardships of feasible risk reduction turns on the philosophical concepts of comparability and fairness. Let's consider each separately.

1. Comparability

Feasibility analysis extends the notion of comparable value to everyday activity. And when we consider the various risks of extinction humanity faces,[250] everyday activity is exactly what is at issue. Professor Keating's analysis touches on this "everyday" aspect:

> Comparing significant risks of devastating injury to the termination of economically productive, but everyday, activities is plainly controversial. If we picture this tradeoff at the level of an individual life, its merits are uncertain. Losing a job—the consequence to those most severely affected of shutting down some ordinary economic activity—does not seem comparable to losing life or limb or to suffering a health impairment which will permanently and severely impair normal functioning and shorten the span of one's life.... We should, it seems, fear devastating injury more than job loss. We are, after all, more likely to find another job than another life or limb.[251]

250. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. __ (forthcoming 2016); http://ssrn.com/abstract=2661651, at 7-22.

251. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 724 (2003).

If we are changing the way we think,[252] and changing the way we live,[253] then changing jobs and employment goals may not be that difficult to accept. Feasibility analysis, applied to everyday activity, helps make the needed changes all the more functional from the standpoint of combining risk reduction and liberty maximization—as long as we can accept that changing jobs is not as devastating as losing life.

The case for comparability between cessation of a major economic activity and the significant risk of devastating injury has three bases. First, feasibility-based risk regulation accepts the validity of prior market forces and valuation. Secondly, like safety-based regulation, it accepts that historical precedent can be uprooted only at an enormous cost. Finally, by treating major productive activities in like manner, it assures an equitable approach to dealing with significant risk.[254]

Equity is important, but arguably, survival is also important. Threats to survival might come from pollution, or they might come from mass hunger due to loss of jobs. Employers could lay off millions of people and really put humanity at risk. Keating is correct to note that "[s]hutting down most of the major productive activities in our economy *would* be a harm comparable to bearing a significant

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252. *See* Safety-Based Regulation in, The Safe Level of Risk Imposition (V.B) above; Sir Crispin Tickell, *Environment on the Edge*, 59 MERCER L. REV. 719, 726 (2008).

253. See *General Structure and Formulation of Feasibility Analysis*, *in* Feasibility Analysis in Practice (IV.C.1) above.

254. *See* Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 725 (2003).
The third and final idea involves applying the test of generalization.

> If a remote risk of devastating injury is indistinguishable from many other such risks, fairness requires us to eliminate all such risks if it requires us to eliminate any of them. ... Eliminating all of these risks is, however, undesirable. Some very low risk of devastating injury is the price of activity, and activity is essential to the leading of any worthwhile human life. The undesirability of eliminating all risk explains and justifies the otherwise puzzling significance criterion found in both safety- and feasibility-based risk regulation.

Id. at 726.

risk of devastating injury."[255] However, not all activities are necessary and comparable to that risk of devastating injury.

The risk from a single occurrence of an activity is not comparable to the risk of thousands of occurrences of that same activity. For example, a jet airplane provides inexpensive and convenient transportation. Thousands of jets[256] each producing tons of carbon dioxide in a race to business and leisure, cause a much greater risk than just one.

If the risks are not significant, it behooves us to let the activity continue. If the risks are significant and morally comparable to the risk of death in global climate change or environmental avalanche,[257] then we would apply feasible risk reduction. If these activities are not morally comparable to the risk of death, then we should limit the activity to the point of comparability.

A surviving humanity will need to regularly re-examine significance of risk in different contexts. Individual risks may not be great, but cumulated or combined with other dynamic risks, they may constitute significant risk. This demonstrates the deficiency of the risk decision tree.[258] The simple tree decision process cannot capture all the risks humanity faces, especially the systemic risk.[259] Instead of ad hoc evaluations of risk, humanity should engineer decision-making filters. Feasible risk reduction should be part of the risk filter.

Our blind acceptance of social, commercial, legal, and even some religious precedent may limit our necessary flexibility.[260] This brings to mind a famous quote often attributed to Darwin himself:

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255. *Id.* at 727.

256. There are 7,000 airplanes over the United States at any given time. Linda Loyd, *Fly the Privatized Skies?*, PHILA. INQUIRER, Sept. 27, 2015, at E1 (graphic). Many of those planes are jets. All emit carbon dioxide.

257. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. (forthcoming 2016); http://ssrn.com/abstract=2661651, at 8-9.

258. *See* MARTIN J. REES, OUR FINAL HOUR: A SCIENTIST'S WARNING: HOW TERROR, ERROR, AND ENVIRONMENTAL DISASTER THREATEN HUMANKIND'S FUTURE IN THIS CENTURY — ON EARTH AND BEYOND 132 (2003).

259. *See* Miguel A. Centeno et al., *The Emergence of Global Systemic Risk*, 41 ANN. REV. SOC. 65 (2015); Steven L. Schwarcz, *Systemic Risk,* 97 GEO. L.J. 193 (2008).

260. *See* Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 733-34 (2003).

"According to Darwin's Origin of Species, it is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself."[261] Whether or not the thought is Darwin's, it is probably true.

We become too tied to our past and not focused on our future. We cling to what we know, and we equate the possible loss of that behavior with possible loss of life and limb. Greg Keating shows us the problem with this position:

> Our mortality and [physical] vulnerability are fundamental facts about us. ... In contrast, the importance to us of various activities whose elimination would remove significant risks of devastating injury—driving our own cars, milling cotton, refining petroleum, having reasonably inexpensive subcompact cars—depends on contingent facts much less fundamental than having vulnerable bodies and being mortal. Indeed, our attachment to any *particular* activity is much more contingent than our need for physical health and bodily integrity and our vulnerability to devastating injury. The socially contingent character of the particular activities to which we are attached might, then, be proof that we can and should learn to live without them.[262]

We cannot survive without our bodies, but we can live without automobiles. We cannot survive without our bodies, but we can live with less seafood in our diets (while fishing stocks regenerate). We cannot survive without our bodies, but we can live with little or no meat in our diet.[263] If we consider fairness to others, to all of us as a

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261. Leon C. Megginson, *Lessons from Europe for American Business*, 44(1) SW. SOC. SCI. Q. 3, 4 (1963). But see Darwin Correspondence Project, Six things Darwin never said – and one he did, *http://www.darwinproject.ac.uk/six-things-darwin-never-said [https://perma.cc/U27K-RAQ6]*.

262. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 734 (2003).

263. Consider: "Researchers at the University of Chicago showed that the meat-intensive diet of the average American generates 1.5 more tons of greenhouse gases per year than the diet of a vegetarian." Joanna Pearlstein, *Organics are not the answer" (Inconvenient Truths)*, 16 WIRED, June 2008, at 159. Consider the

species, we can change the way we think and we can change the way we live.

2. Fairness

There is exciting new research about the origins of altruism and fairness in both ourselves and in other animals. For example, if one gives two monkeys hugely different rewards for the same task, the one who gets the short end of the stick simply refuses to perform. In our own species, too, individuals reject income if they feel the distribution is unfair. Since *any* income should beat none at all, this means that both monkeys and people fail to follow the profit principle to the letter. By protesting against unfairness, their behavior supports both the claim that incentives matter and that there is a natural dislike of injustice.[264]

Fairness is considered in the context of weighing hardships. Emphasizing fairness may not be the most efficient approach to survival. Our market economy is more "efficient," but it may not be fair. Risk reduction has an element of fairness. According to Keating, "Fairness requires that an activity which imposes a significant risk of devastating injury be to the advantage of those most burdened by it, in the sense that it reconciles their competing interests in liberty and security more favorably than eliminating the activity does."[265] Fairness also means respecting, honoring, and

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benefits of eating lower on the food chain. Consider reduced concentrations of toxics. Consider more food for hungry people. Consider fairness. Don't forget to consider simpler logistics, fewer costs (greater economic feasibility?) and fewer risks (greater technological feasibility?).

264. FRANS DE WAAL, THE AGE OF EMPATHY: NATURE'S LESSONS FOR A KINDER SOCIETY 5 (2009). "[D]on't believe anyone who says that since nature is based on a struggle for life, we need to live like this as well. Many animals survive not by eliminating each other or keeping everything for themselves, but by cooperating and sharing." *Id.* at 6-7. "Greed is out, empathy is in." *Id.* at ix. I plan to examine the duties implicit in the fairness instinct in a future work.

265. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 735 (2003).

This concept of fairness has a definition. It is not the same as the fairness each of us sees and experiences subjectively. With subjective fairness, different people come to different judgments about fairness all the time. But with a definitional approach, there is an attempt to aim for a unity or commonality of idea, a shared understanding.

preserving the lives and health of the unconsenting, those who would be involuntarily placed at risk.

When we talk of significant risks to human survival, we all bear the burden, the significant risk of devastating injury. Now, in theory, all of humanity is together, weighing benefits and burdens. This already happens in the context of the global marketplace. As Keating points out, however, fairness is different from efficiency, and a general background of fairness supports the same in individual transactions.[266] We need to establish a system of fairness in order to move from efficiency and growth to a sustainable state.

How can we achieve fairness? We could require that externalities be internalized or reduced in any measurement of costs and benefits. However, such an approach may not protect us when risks are not ascertainable or measurable. Also, as CBA is inappropriate to evaluate survival risks,[267] we should disregard CBA whenever costs and benefits are incalculable.

Feasible risk reduction can take on an aspect of the common law of strict liability which "requires that the risk from the product be reduced to the greatest extent possible without hindering its

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> The market vouches for the efficiency of the activities which flourish within it, not for their fairness. The efficiency of market transactions is assured by their being mutually advantageous (Pareto-superior) for market actors, but the fairness of market transactions is not. Fairness of market transactions depends on the institutional framework within which those transactions take place. Market transactions are generally fair when they take place against a just background—against a just (or fair) assignment of initial rights and entitlements and a just distribution of resources, both governed over time by principles which prevent initially fair starting points from deteriorating into unfair distributions of rights and resources. It is the sustained presence of 'background justice' which vouches for the fairness of individual transactions.

Id. at 738.

267. *See* John William Draper, *Why Law Now Needs to Control Rather than Follow Neo-Classical Economics*, 33 PACE ENVTL. L. REV. __ (forthcoming 2016); http://ssrn.com/abstract=2661651, at 50-66.

utility."[268] In the interest of fairness, Keating might have us implement common law courts "to judge some products—and by extension, some activities—as not worth having, because their significant risks of devastating injury are not offset by some comparable benefit."[269] In the interest of justice, in the interest of fairness, could the courts weigh feasibility as part of substantive common law? If so, common law courts could better help with the interpretation and justice of *ex ante* protection mechanisms.

Remember, common law damage solutions are *ex post*.[270] They will not help humanity with survival issues. Courts can help with survival issues more through interpretation of regulations, and less through assessment of damages after the fact.

If our species can use regulation to implement standards ahead of injury (*ex ante*), to head off the risk, we are still intact. If the regulations attempted to reduce externalities to improve our precision, and if we also attempted to modify behavior through gradations in taxation,[271] we might be able to change the economics of these activities, control their frequency and impact, and at the same time, raise money to provide incentives for other necessary behavior, some of it worldwide. Could this be possible?

As with any tax, there would be an infinity of ways to spend the money. However, it cannot be politics as usual. Humanity must consider going so far as to place its collective thumb on the scale in favor of human survival.

D. Defending Feasibility Analysis

When we face significant risk, we should rely on a decision-making process that protects both safety and liberty. Currently, because of our tradition, our norm, of seeking maximum profit, we

268. *Beshada v. Johns-Manville Prods. Corp.*, 447 A.2d 539, 545 (N.J. 1982).

269. Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification,* 56 VAND. L. REV. 653, 740 (2003).

270. "When risks threaten devastating injury—premature death or severe harm whose debilitating effects can never be fully undone—redistribution after the fact cannot align burden and benefit proportionally. Fairness must be done at the time that risk is imposed, not after it issues an injury." *Id.* at 746.

271. Consider Reuven S. Avi-Yonah, *Taxation as Regulation: Carbon Tax, Health Care Tax, Bank Tax and Other Regulatory Taxes*, 1 ACCT. ECON. & L., No. 1, 2011.

rely upon cost-benefit analysis,[272] which imposes its values, and in the process of doing so, it distorts common—basic and fundamental—human values. By appealing to our selfishness, it obscures moral values, especially when we consider the values of property (emphasized in CBA) relative to liberty and life (which are more fundamental and are emphasized in feasibility analysis).

CBA obscures morality by causing us to consider what we could have received if we had not played it quite so safely. It encourages needless risk-taking. The premises and the values are misplaced toward efficiency and property and not toward life, liberty, and fairness. The assumptions of CBA are erroneous. However, feasibile risk reduction still needs to be defended even if the opponents are not on solid ground.

Jonathan Masur and Eric Posner argue that feasibility analysis should be rejected because it is ambiguous and it has unacceptable normative implications.[273] Unfortunately, their position is largely comparative.[274] The problems of feasible risk reduction are matched against the efficiencies of CBA. When they dismiss feasible risk reduction from the fortress of neo-classical economics, they are merely advocating efficiency and self-interest, each of which turn out to have significant side effects and risks. Unfortunately, the efficiency arguments Masur and Posner use represent the philosophy

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272. Although CBA was developed as a decision-making tool in 1848 (*See* ARSÈNE JULES ÉTIENNE JUVÉNAL DUPUIT, ÉTUDES THÉORITIQUES ET PRATIQUES SUR LE MOUVEMENT DES EAUX COURANTES [STUDIES ON FLOOD MANAGEMENT] (1848)), it was not fully implemented in the American economy, sans the corporatist philosophy of the New Deal (*see* discussion of corporatism and Adolf Berle in William W. Bratton & Michael L. Wachter, *Shareholder Primacy's Corporatist Origins: Adolf Berle and The Modern Corporation,* 34 J. CORP. L. 99 (2008)), until the 1970s economics of Milton Friedman (*see* Leo E. Strine, *Human Freedom and Two Friedmen: Musings on the Implications of Globalization for the Effective Regulation of Corporate Behavior*, 58 U. TORONTO L.J. 241, 257 (2008)) and the 1980s politics and administration of Ronald Reagan (*see* discussion of E.O. 12,291 in *Feasibility Analysis in Practice* (VI.C) above).

273. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 712 (2010).

274. We may find some difficulties inherent in feasibility analysis through a comparison with CBA, but the difficulties will principally concern the position against which feasibility analysis is being compared. To the extent that position is flawed, so is the comparison.

behind much of today's manmade global risk. As the efficiency that they desire is on track to kill the planet, their theoretical attack fails.

We have already considered Masur and Posner's examination of feasibility analysis in practice. We saw that the politics and the inconsistencies of application of feasible risk reduction regulation have greater impacts than any theoretical flaws in feasibility analysis itself.

Only a few of their objections remain: Path-Dependency and Time-Inconsistency, problems of Social Welfare Analysis, and the matter of Finding a Normative Basis for Feasibility Analysis. Let's address each.

1. Path-Dependency and Time-Inconsistency

Masur and Posner point out that scientific discoveries can change the economic feasibility of regulation *after* the fact. Enterprises that have already been bankrupted would not have been, had the discovery occurred sooner—or had the regulation been less stringent.[275]

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275. The example provided by Masur and Posner is illustrative:

> Suppose that an industry produces hazardous emissions that kill ten people per year. The industry has revenues of $1 million, costs of $900,000, and profits of $100,000. Under some versions of the feasibility approach, EPA should choose a level of regulation that reduces emissions to the maximum extent consistent with avoiding widespread plant shutdowns or bankruptcies. Let us stipulate that a regulation X that costs $90,000 would save 9 lives and avoid shutdowns and bankruptcies, leaving the industry as a whole with profits of $10,000. Next year, scientists discover that this same industry emits another hazardous substance. This substance kills 100 people per year. A regulation Y that costs $50,000 would save 99 of these people but would also bankrupt the industry, which now has profits of only $10,000. Accordingly, feasibility analysis would forbid the agency from promulgating this regulation.

Id. at 696. The main problem for the professors appears again here with the concept of economic feasibility. It may be helpful here to remember the main concept of feasibility. The problem of feasibility is not one of feasibility of regulation. The problem is one of feasibility of activity. The activity comes first,

The path of bankruptcies seems arbitrary to them. They point to a temporal arbitrariness of feasibility analysis based on the irregularity of quality and timing of advances in technology: This "arbitrariness that feasibility analysis produces" reflects the arbitrariness of science,[276] not arbitrariness within risk management. One goal might be to try to align advances in science with survival, rather than with profit, in order to attempt to address these concerns.

Masur and Posner argue instead that the best approach is to stall: "Agencies can reduce the risk of path dependency by refusing to issue regulations that consume a large portion of an industry's profits."[277] The trouble with such a refusal is that in many instances then there would be no safety feature whatsoever.

Regulatory protections would look like Swiss cheese. For goods and services with low marginal profit and elastic demand, costly regulation is likely to have a greater impact on a larger portion of an industry's profits, especially where profit is based on high volume. The goods produced are often ones people can do without. At that point, because people can live without the product or activity, production substantially ceases either to the point of feasible risk reduction, or altogether.

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followed by considerations of safety, followed by observations and measurement of inelasticity. Weighting of significant risks and commensurability would appear to be part of this last step.

276. Technological change may occur in "discontinuous leaps." "Each crucial invention is made through the luck or genius of an individual living in a supportive society and probably benefiting from interacting exceptional people." Eric Jones, *Technology, the Human Niche and Darwinian Explanation*, *in* SURVIVAL AND RELIGION: BIOLOGICAL EVOLUTION AND CULTURAL CHANGE 163, 167 (Eric Jones & Vernon Reynolds eds., 1995) (citing JOEL MOKYR, THE LEVER OF RICHES (1990)). As economic historian Joel Mokyr argues, "the economic history of technology can be understood in terms of the Gould-Eldredge model of punctuated equilibria" (*Id.* at 166 (citing JOEL MOKYR, THE LEVER OF RICHES (1990))) in the field of biology. Over the course of history, scientific and technological change have tended to be bumpy. Eric Jones "urges that technological changes, including the conceptual breakthroughs on which Mokyr places so much emphasis, did not occur randomly but tended to emerge as societies ceased to select against them." (*Id.* at 168). Whether technological advances are random or the product of social activities and conformity, the current randomness of technological advance is unlikely to serve the long-term purposes of humanity.

277. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 697 (2010).

If there was nothing scientifically specialized and particularly indispensable about a product, Masur and Posner would protect such industry from regulation as this industry would be at risk from lack of relevant innovation. Such protections would most likely be removed, then, for at least some activities of high environmental impact. Wherever one would find significant elasticity, greater quantities and relatively low per-unit profits would be at risk, and therefore feasible risk reduction would be held in abeyance. Effectively, then, feasibility regulation would be gutted, not due to a problem with feasibility analysis but because scientific advances have not been geared to feasible risk reduction.

2. Social Welfare Analysis and the Welfarist Virtues of Feasibility Analysis

The second objection pertains to social welfare. Professors Masur and Posner advocate social welfare maximization. They argue that feasibility analysis fails to be consistent with that end.

Social welfare maximization reflects a quantitative decision procedure with an aim focused on maximization.[278] Unlike some other decision procedures, it permits consideration of risks to life, liberty and property. As Masur and Posner explain, "Social welfare maximization favors wider approaches, to the extent that decision costs can be minimized, because people's welfare depends on a range of activities and conditions, not just (for example) the bare fact of being alive."[279] Social welfare analysis borrows aspects of utilitarianism and even CBA. Instead of counting money, satisfaction (happiness) may be considered, calculated and weighed. It may be reduced to a single metric and weighed against cost. As we will see, the happiness considered is limited to the views of only some and not all.

Social welfare theory looks to reduce decision costs and factor more than just life into the decisions. There is no special relative weighting between life, liberty, and property. In this sense, social welfare analysis turns out to favor property by placing it on a par

278. This approach is consistent with the view of Delaware courts, that profit maximization is a corporation's fiduciary duty. *eBay Domestic Holdings, Inc. v. Newmark*, 16 A 3d 1, 34 (Del. Chancery 2010).

279. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 699-700 (2010).

with life and liberty.[280] The theory, then, offers nothing special to protect life.

Happiness and consumer satisfaction, the measurement of welfare, can come from various combinations of liberty and property. This seems consistent with income maximization and wealth maximization. If we use more, do we think we are happier?[281] For those who think so, social welfare analysis represents yet another foot on the gas pedal.

Feasibility analysis, on the other hand, represents a foot on the safety brake. Feasibility is not a welfare-oriented decision procedure. That is why it is problematic in the context of social welfare analysis. Feasibility analysis is risk analysis. It exists primarily as a means of controlling risk and ensuring safety. It may be implemented in a way that places life over liberty and property, a kind of sufficientarian approach.[282] This would support notions of morality, justice, and human survival.

When Masur and Posner examine feasibility through a welfarist lens, they spot the "three welfarist virtues of feasibility analysis" as advanced by David Driesen, whom they regard as "the leading defender of feasibility analysis."[283] Masur and Posner then attack each of the three virtues for its shortcomings. The three virtues are:

> that [feasibility analysis] ensures that agencies regulate industrial processes that create harms that are difficult to monetize; that it ensures

280. Such a ranking is problematic. Consider the ranking of fundamental rights. If life is not supported by both liberty and property, humanity places itself at risk.

281. There are many studies showing that happiness is not tied to things or wealth. Recent studies have tied it to gratitude. Emily L. Polak & Michael E. McCullough, *Is gratitude an alternative to materialism?*, 7 J. HAPPINESS STUD. 343 (2006); Jeffrey J. Froh et al., *Gratitude and subjective well-being in early adolescence: Examining gender differences*, 32 J. ADOLESCENCE 633 (2009); Steven Toepfer et al., *Letters of gratitude: Further evidence for author benefits*, 13 J. HAPPINESS STUD. 187 (2012).

282. *See, e.g.,* Christopher Freiman, *Why Poverty Matters Most: Towards a Humanitarian Theory of Social Justice*, 24 UTILITAS 26 (2012); Liam Shields, *The Prospects for Sufficientarianism*, 24 UTILITAS 101 (2012).

283. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 700 (2010) (citing 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, 34-41 (2005)).

> that regulation does not impose concentrated harms on workers and spreads the costs of regulation among consumers; and that it provides clear guidance for agencies, thus avoiding arbitrary and inconsistent regulatory outcomes.[284]

Let's consider their view of Driesen's virtues.

a. Does Feasibility Analysis Overcome Difficulties with Monetization?

Feasibility analysis's first virtue is that it helps where monetization is difficult. It is based on an assumption "that known risks of harm should be reduced as far as possible, consistent with technological and economic feasibility."[285] As Masur and Posner note: "Although one must identify harmful substances—so, again, lack of available data could still hinder regulations—once one has done this, it is not necessary to calculate precise risks and to monetize harms."[286] Although substances subject to regulation in the course of manufacturing are the immediate subject matter, feasible risk reduction can be applied widely to maximize liberty within the realm of reduced risk.

Masur and Posner are correct to note that feasibility analysis stipulates that "the economy should not be shut down." They go on to question, since feasibility analysis "does not explain how far regulation should go: at what point should we regard suppression of economic activity as too great to justify a regulation that reduces risk?"[287] This aspect of feasibility analysis (the concomitant measurement of safety and feasibility without monetization) has not yet been refined. What Masur and Posner see as a flaw is likely a future refinement in Driesen's virtue.

Economic feasibility is in need of further refinement. We do not yet have an effective test that honors both the requirements of a safe life and the liberty interests implicit in feasibility itself. Critics express concerns about inelasticity of demand, the goods and services

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284. *Id.* (citing 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, 37-38, 41-48 (2005)).

285. *Id.* at 701.

286. *Id.*

287. *Id.* at 702.

we say we cannot live without. Measuring and identifying critical points in elasticity of demand may help us better gauge the maximum amount of liberty humanity can safely have with those activities that bear significant risk.

b. Are Thin Increases in Consumer Cost the Same as Worker Hardships?

Driesen argues that feasibility analysis does not impose excessively concentrated plant closings or other such hardships on workers and communities.[288] Instead, a thin increase in consumer cost, spread widely, can be weighed against the cost of preventing seriously diminished health (say, lung cancer prevented by air pollution regulation) for a few.[289]

Masur and Posner object, saying, "the focus on avoiding concentrated harms does not justify feasibility analysis in a broad range of cases."[290] For instance, "feasibility analysis may force regulators to trade the health (and lives) of a few individuals for the jobs of a greater number of workers."[291] It may be that in some cases a focus on concentrated harms would not be justified. On the other hand, if we focus on those harms with catastrophic risk or risk of life and death, those decisions may be easier to make.

The professors also object to the special treatment of risk: "in an effort to emphasize larger concentrated costs over smaller dispersed ones, feasibility analysis errs by valuing those small costs at zero."[292] However, the primary purpose of feasibility analysis is the reduction of *significant* risks. As we weigh risks, we weigh fundamental rights. We value life over liberty and property. Masur and Posner are wrong: feasibility analysis does not value other fundamental rights at zero. It merely prioritizes a commitment to life.

Although feasibility analysis can be morally strong, current implementation is flawed. For example, the professors observe significant problems of compromised design and implementation:

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288. *See id.* (citing 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, 37-40 (2005)).

289. *See* Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 703 (2010).

290. *Id.*

291. *Id.*

292. *Id.*

> The approach of feasibility analysis thus creates significant problems of over- and underregulation. Overregulation occurs because feasibility analysis ignores the cost of regulations to consumers—the costs they incur because prices rise or products disappear from the market. Underregulation occurs because feasibility analysis tolerates dangerous industrial practices if regulation would shut down plants.[293]

Under-regulation and over-regulation are arrived at by Masur and Posner's definition, based on their value judgments.

The professors are right to be concerned that costs not be ignored. However, rather than drive the process, costs should be the result of a process. When it comes to fundamental rights, costs—property-oriented values—should not be the cause of regulation so much as respect for life and liberty.

If feasibility analysis is properly applied, it is applied within a series of steps, first with a determination of significance of risk, secondly with selective application of the safety standard, followed then by the application of technological feasibility. If that technological analysis is properly applied, some practices bearing significant risk would be tolerated. The examples Masur and Posner consider pertain to economic feasibility.

The professors then compare what they see as under-regulation and over-regulation with CBA. Their statement about CBA is telling: "CBA, by contrast, takes into account all the costs that regulations impose on consumers, as well as the benefits."[294] However, CBA misses externalities—and thus does not take into account *all* the costs of the practices being regulated, only the direct and measurable costs of the regulation. This is a crucial flaw. Even consumers, the primary focus of CBA, pick up a layer of significant risk. And many of the problems that Masur and Posner attribute to feasibility analysis also apply to CBA.[295]

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293. *Id.* at 704.

294. *Id.*

295. *See* David M. Driesen, *Two Cheers for Feasible Regulation: A Modest Response to Masur and Posner*, 35 HARV. ENVTL. L. REV. 313 (2011). For instance, Driesen shows that CBA proves path dependent and time inconsistent. *See id.* at 334-36. Unfortunately, attacking CBA, without more, does nothing to show how feasibility analysis is functionally any less risky than CBA.

But the professors help identify the key problem with the systematic use of feasible risk reduction, and that is whether a system built on unlimited self-interest can be brought under control without wrecking it and causing the crash we all seek to avoid. Can humanity be flexible enough to make the changes necessary for its survival? Can we find ways to feed the hungry? Can we find ways to employ, reuse, and reinvent? And how can we all afford it when we are so deeply in debt? These are not easy questions. These concerns need to be addressed in a new academic conversation.

c. Is the Guidance from Feasibility Analysis Sufficiently Clear?

The third and final virtue of feasibility analysis advanced by Driesen is that of clarity, that the feasible risk reduction procedure provides meaningful guidance to regulators.[296] Masur and Posner respond by arguing vagueness, or more precisely, problems with theoretical coherence:

> The real problem is not the vagueness of words—words are always vague—but the absence of a theoretically coherent normative basis for feasibility analysis, a theory the analyst can draw upon in order to flesh out these terms in specific regulatory contexts. CBA also uses vague terms, and requires some choices that are relatively arbitrary. But if the analyst keeps the overall goal of CBA in mind—the promotion of public wellbeing—then the ambiguities can be resolved. Feasibility analysis's notion of balancing employment and health and safety provides no similar guidance because it offers no theoretical way to determine the correct balance.[297]

Masur and Posner are correct: The means to determine the correct balance have not yet been perfected. As a result, they conclude, "Our own survey of feasibility analyses by agencies provides little

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296. *See* 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, 41-48 (2005).

297. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 705-06 (2010).

evidence that this test guides or constrains agencies."[298] Although they seem not to recognize it, they show that feasibility analysis has been misapplied. This is not, as they contend, the same as a lack of theoretical foundation. Politics assist with the misapplication and cause feasible risk reduction to appear toothless and meaningless.

But feasibility analysis does offer guidance—the reduction of risk *to the extent feasible*, first technologically, and then economically. Each is a separate test.

The guidance says nothing about job losses or plant closings.[299] It aims only at risk, but it does so with clarity and transparency, to allow the kind of signaling that our array of risks require. This technological feasibility involves a current or a "doable" standard. In its common form, technological feasibility follows from identification of significant risk and the decision that the activity cannot cease without another risk, a commensurable and significant risk. The guidance is clear.

It may be possible to reduce technologically feasible risk reduction to a scientific calculation. The next step, risk reduction to the extent economically feasible, involves a calculation that says, "We cannot afford to do without *this much* of this activity." We may not yet know how to make that calculation accurately, and if we are not careful, we could place either incommensurable risks on equal footing or one commensurable risk in a dominant position over another.

3. Finding a Normative Basis for Feasibility Analysis

Masur and Posner question whether feasibility analysis has a normative basis. Is the kind of thinking behind feasible risk reduction part of our normal behavior? Do humans attempt to maximize liberty after doing their best to maximize safety? Some do, but in the Land of Liberty, the approach of feasible risk reduction has not been generally operationally endorsed. Perhaps our wide array of

298. *Id.* at 706.

299. Competitive politics have required the consideration of job losses and plant closings. Unfortunately, David Driesen considers this part of the theory of feasible risk reduction. *See* 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).

decision-making reflects different values, valuations of activities, or tolerances of risk.

But as we have already discussed,[300] risk decisions need to be informed decisions. The combinations of risk before humanity are greater than we have perceived them to date. Maybe "Safety First" should have a greater and wider appeal.

As Masur and Posner consider a wide range of behavior, they return to welfarism, a decision-making system that considers overall well-being: "Welfarism normally suggests that all aspects of a person's well-being be taken into account . . . ."[301] Although the considerations may sound all-encompassing, this approach is splintered in that welfare seems to pertain to or attach to only a limited class of people, not to everyone. Those who are in the position to make the calculation are making it for themselves or their group. The effects on the well-being of others outside the group are not taken into account.

A limited welfarism that takes self-interest into account is likely to generate negative externalities for others. Welfarism is also splintered, scattered, or better, overextended, in another way. Welfarism tries to do too much with its emphasis on taking all aspects of well-being into account.

Although Masur and Posner support welfarism as the norm against which feasibility analysis should be applied, they raise a very interesting possibility:

> Perhaps, though, feasibility analysis can be based on a version of welfarism that stresses [employment, health, and safety] over all others. This could be attached to incommensurability worries—that certain values shouldn't be traded off each other, that it is wrong for an agency to hold off regulating a substance that damages workers' lungs so that consumer products will be a few dollars cheaper.[302]

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300. *See Confronting Risk* (I.) above.

301. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 707 (2010).

302. *Id.* at 707-08 (citing ELIZABETH ANDERSON, VALUE IN ETHICS AND ECONOMICS 44-64 (1993)).

The professors note that most economists reject this argument[303] but that such philosophers as Martha Nussbaum can identify a list of basic qualities that constitute well-being. The list of values they extract from Nussbaum's work includes: "life; bodily health; bodily integrity; senses, imagination, and thought; emotions; practical reason; affiliation (including the goods of both friendship and self-respect); play; other species; and control over one's environment (including both political rights and property rights)."[304] Here we encounter a rift between philosophy and economics: Whether to weigh all values as equal, or some as most fundamental and incommensurable with the others. We will return to the rift momentarily.

F. Implementing Welfarism with Feasibility Analysis

Can we connect the decision philosophy of welfarism to survival theory? Welfarism attempts to measure such things as happiness,[305] often through the employment of polling with a unitary metric. Welfarism's approach seems limited or incomplete, though, as current conceptions seem to help only some people. As originally conceptualized, welfarism applied to the individual.[306] Generally to date, it has not been extended to groups or organizations.[307] We

303. Although no reason for rejection is provided, the economists' rejection is likely to be based on efficiency concerns. These are the very same concerns that have caused us to chew up and poison our environment at an increasing rate. Efficiency, without more, is the basis for a philosophy of growth.

304. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 708 (2010) (citing MARTHA C. NUSSBAUM, WOMEN AND HUMAN DEVELOPMENT: THE CAPABILITIES APPROACH 78-80 (2000)).

305. What matters more than the degree of happiness is the source of the happiness. Recall that happiness research overlooks the notion that the source of one's happiness matters. *See* Sean Hannon Williams, *Self-Altering Injury: The Hidden Harms of Hedonic Adaptation*, 96 CORNELL L. REV. 535 (2011). At this point in history, achieving happiness through equality or cooperation should be preferable to doing so through consumption or overpopulation.

306. *See* L.W. SUMNER, WELFARE, HAPPINESS AND ETHICS 184-223 (1996); Andrew Moore & Roger Crisp, *Welfarism in Moral Theory*, 74 AUSTRALASIAN J. PHIL. 598 (1996).

307. But see the country of Bhutan's tracking of gross national happiness (GNH). However, GNH represents a cumulation of individual perspectives. See, Thaddeus Metz, *Gross National Happiness: A philosophical appraisal*, 8. ETHICS & SOC. WELFARE 218 (2014); Tokuda Yasuharu et al., *Individual and Country-*

should not pay attention to the well-being of only certain individuals. Instead of helping just some, it would be best to help all of us survive and achieve a decent life.

Welfarism also fails to consider individuals holistically. It only considers the subjective well-being of those individuals polled *as consumers*.

Welfarism is a distributional decision-making system that argues for maximum happiness. Where does this social welfare theory fit with survival theory? Distribution analysis does not need to—and should not—displace risk analysis.

We need to implement measures of risk reduction and safety before filtering for anything else. Human decision-making processes are likely to be clogged and inefficient if they are required to process and distribute risks that humanity shouldn't be taking in the first place. And the distractions these efforts create can, at the very least, obscure our vision of risk.

As a result, there are two conditions for the application of welfarist decision analysis to survival theory:

1. Welfarism must be complete. Welfare analysis, distribution analysis, must cover everyone,[308] since we are all on this Earth together.[309] We are one.[310]

2. Risk analysis must occur first in sequence. There is nothing wrong with Safety First. Once a decision is on solid and safe ground, we can consider welfare and fairness and forward-looking

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Level Effects of Social Trust on Happiness: The Asia Barometer Survey, 40 J. APPLIED SOC. PSYCHOL. 2574 (2010).

308. To fail to recognize the fairness needs of everyone may is likely to increase the risk to the group as well as the risk to certain individuals within it.

309. This is a tall order for welfarism. Welfarism is grounded in the sanctity of the rights of the individual. The question may be whether we can view the greater group of humanity as an individual, as one.

310. Thanks, Bono Vox.

Being one is not a simple task. As Richard Falk observes, "[N]onparticipation and oppression go together even if 'the oppressor' adheres to a benign creed." RICHARD A. FALK, THIS ENDANGERED PLANET: PROSPECTS AND PROPOSALS FOR HUMAN SURVIVAL 310 (1971). This means that *being one* cannot be forced. Any resulting insurrection might carry significant risk. Although a wise man once said it's easier to catch bees with honey than with vinegar, that view should not serve to trivialize the effort and care required to succeed. By providing insight into animal motivations, the idea of attraction merely gives direction for the effort of cooperation.

distribution. In the interest of life, first, and liberty, second, decisions need to be safe, first, and fair, second.

Even once we have taken risk into account, we are not entirely finished with risk. Welfarism itself contains a risk of failure. Welfarist applications, especially those that focus on a limited group, contain an unnecessary risk, the failure of fairness. Unfair distribution represents a risk.[311] Among other problems, such behavior invites rebellion by the have-nots.[312] For this reason, welfarism should be applied relatively early in the decision-making process. Once life is assured, fairness and justice in the interest of liberty must be considered.

Exactly how we should implement the decisional filter of welfarism is a complex question deserving further investigation. Philosophers, economists, lawyers, scientists, and environmentalists, all of us need to carefully consider implementational issues of equity, fairness, and justice. Where fairness considerations collide with the needs of humanity's life support system, are we not all environmentalists? By sequentially following risk analysis, welfarism represents a stabilizer, possibly a critical stabilizer, with regard to certain liberty of action.[313]

1. Welfarist Problems with Incommensurability

Returning to the rift between philosophy and economics. The question is whether all of welfarism's qualities of wellbeing (e.g., the "open-ended and humble"[314] list of ten central human functional capabilities identified by law and philosophy professor Martha Nussbaum) are commensurable remains.

Masur and Posner side with the economists, in favor of commensurability between many of the Nussbaum's rights, as they

311. These distributional risks can be separated from other significant risks as, in a time of scarcity, risks of fairness pertain to the liberty interests of the taker at the possible expense of life itself.

312. Generally, welfarism should not invite rebellion by the "haves," as the forward looking distribution of welfarism in the context of survival does not include redistribution from the haves to the have-nots. However, there should be a concern about those haves who make a living by exploiting the commons.

313. It may be that one of the most effective ways to implement social welfare theory is through taxation.

314. MARTHA C. NUSSBAUM, WOMEN AND HUMAN DEVELOPMENT: THE CAPABILITIES APPROACH 77 (2000).

compare their conception of welfare to the welfare afforded by feasibility analysis: "Feasibility analysis advances bodily health and bodily integrity but it does not take into account the other goods, with the result that regulations will favor only two of the eight items on Nussbaum's list and, similarly, a small portion of the goods on other philosophers' lists."[315] There were actually ten items on the list,[316] but their point seems to be that many goods, possibly including life itself, would be ignored.

Doesn't feasibility analysis advance life as well as bodily health and bodily integrity? Masur and Posner seem to place at least some of the functional capabilities in Nussbaum's analysis[317] on a par with life (including the bodily health and bodily integrity that are necessary for life). They are not precise about what they favor. If they do place even a few of the remaining characteristics or rights on a par with life, their analysis is likely to fail to recognize the incommensurability of life itself.

Generally, those remaining items tend to be, by function, parts of human nature or parts of liberty. There is dominion in the property rights. And finally, as an interesting exception, the rights include other species, parts of humanity's life support system.[318] Masur and Posner seem to prefer having more of these values or capabilities on the same plane with life, bodily health, and bodily integrity (bodily health and bodily integrity being taken to include life itself).[319]

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315. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 708 (2010).

316. For whatever reason, Professors Masur and Posner failed to explicitly consider the human capability of "life" in their analysis.

317. Again, the remaining seven qualities, numbers four through ten from Nussbaum's list, are: 4.senses, imagination, and thought; 5. emotions; 6. practical reason; 7. affiliation (including the goods of both friendship and self-respect); 8. other species; 9. play; and 10. control over one's environment (including both political rights and property rights).

318. Due to risk of environmental avalanche, the rights and health of other species is a risk on a par with life and health.

319. Would Martha Nussbaum consider the ten functional capabilities comparable? She does not consider them interchangeable: "The list is emphatically, a list of *separate components*. We cannot satisfy the need for one of them by giving a larger amount of another one. All are of central importance and all are distinct in quality." MARTHA C. NUSSBAUM, WOMEN AND HUMAN DEVELOPMENT: THE CAPABILITIES APPROACH 81 (2000). The components are not fungible. Some are not commensurable with others. There is a comparability problem, and Professor Nussbaum avoids it.

Although some of the values may belong on that plane,[320] others don't. The prime value of life in the ranking of fundamental rights reveals the flaw in an approach the treats all ten functional capabilities as being of similar quality and significance. Liberty and property rights are means to support life, not ends like the infinite value of life itself.

However, feasible risk reduction, the approach Masur and Posner attack, turns out to be appropriate when life is ranked over liberty and property. The three are incommensurable. Life and health deserve special treatment, especially the lives and health of those who have not consented to risk exposure.

G. Summarizing Feasibility Analysis in Risk Regulation

How we approach risk regulation makes a huge difference. If our object is to regulate a significant risk and protect against it, we need safety and feasibility analysis. If our object is maximize societal wealth or social welfare, we need CBA or social welfare analysis.[321] The rule depends upon the goal.

Masur and Posner are concerned about consumers, the efficiencies of CBA, and regulatory precision, rather than accuracy and safety. By making an efficiency-based claim, they find that governmental use of feasibility analysis leads to both under- and over-regulation. By what standard? By comparison to CBA, of course. Their concern is that excessive risk reduction harms consumers.[322] Generally, there is not an identity of regulation between the two theories. They are based on entirely different principles, and their purposes differ. However, Masur and Posner conclude that "feasibility analysis lacks a normative justification and should have no place in government regulation."[323]

In response, one could conclude that CBA lacks a safety-based justification and that it, instead, should have no place in government

320. Arguably the senses (part of bodily integrity) and other species (our life support system) are on the same plane as life.

321. Social welfare analysis includes, for example, the welfarist distribution analysis discussed in *Implementing Welfarism with Feasibility Analysis* (VI.F) just above. Definitions of social welfare can abound, but generally, the notion includes maximization.

322. To date, we have tended to worry first about GDP.

323. Jonathan Masur & Eric Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657, 662 (2010).

regulation. Is the purpose of government regulation to protect us or is it to make sure that a few of us achieve great wealth—even when it comes at the incommensurable expense of significant health and safety risks for everyone? Without feasible risk reduction, even those who are among the lucky few will find themselves at risk from their own activities. No one will be safe. However, if it is well engineered, better than it has been, feasibility regulation can protect us all and simultaneously provide us, Americans, and even humanity, with the maximum amount of safe liberty.

CONCLUSION

No matter how many theories of risk there may be, humanity has an interest in quickly researching the spectrum of risk reduction in between traditional CBA and the precautionary principle, to find useful stops and approaches and to figure out how they may best be used for the survival of the human species.

I argue that humanity should employ the safety and feasibility standards as a combined decision tool. Safety and feasibility stack on top of each other. Either would be employed for the same degree of risk: only for practically foreseeable risks that are significant (and for at least some of those risks subject to accumulation, combination, or erosion into significance).

We need to think about and attempt to plan the transition. If we do it poorly, it will be like slapping on the brakes on a narrow road. If we do it well, we will be dealing with the next systemic problem.

We must begin by determining significant risk, followed by selective use of the safety standard, and next by assessing elasticity of demand for risk-producing behavior in order to protect essential liberty. There are some behaviors (e.g., the manufacture of some things) that we cannot live without. If we can live without the behavior, it should be subject to the safety test either as a life-saving application as with clean air and clean water, or by reducing risk to insignificance with feasibility analysis. Then, if we cannot live without the behavior, we must reduce significant risk to the extent feasible.

Certainly other tests can and should be brought into play.[324] For example, there should be some kind of decision tool or filter for equity and fairness. We may also want some limits on behavior that interferes with important fundamentals such as education. Humanity should probably want systems of nudges and clear signaling to help encourage necessary cooperation. Otherwise, we become too much the police state, and incur new risks. We need liberty.

Our systems must express love and respect for the life of the human family. Let's work together to do what we can to save lives without giving up our most precious liberties. For the risks that we are unwilling to eradicate,[325] let's reduce significant risk and preserve lives in being to the extent feasible.

By employing these decision tools together in the law, humanity better controls risk and begins to systematize approaches toward a longer-term survival of the human species. By protecting life to the extent possible, we can better see and more easily understand how to value life over liberty and property. We put actions in place of words, and we embrace in law a shared future of justice and life.

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324. There are many risk reduction tests, filters, approaches and requirements that should be considered for use in a new decisional system. These include systems of nudges and defaults (*See* RICHARD H. THALER & CASS R. SUNSTEIN, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS (2008); Cass R. Sunstein, *Deciding by Default*, 162 U. PA. L. REV. 1 (2013)), concern-driven risk management (*See* Louis Anthony (Tony) Cox, Jr., *Does Concern-Driven Risk Management Provide a Viable Alternative to QRA?*, 27 RISK ANALYSIS 27 (2007)), the Laswellian approach to policy analysis (*See* Sidney A. Shapiro & Christopher H. Schroeder, *Beyond Cost-Benefit Analysis: A Pragmatic Reorientation*, 32 HARV. ENVTL. L. REV. 433 (2008)), and informational regulation (*See* Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection,* 150 U. PA. L. REV. 1553, 1582 (2002)).

325. An unwillingness to eradicate a behavior would be for a good or service with highly inelastic demand in the face of significant risk.