# AT RISK WITH NO BENEFIT: REGULATING ENVIRONMENTAL RISKS OF PREMATURE DEATH

BY

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*In standard cost-benefit analysis (CBA), regulatory agencies use a figure known as the "value of a statistical life" (VSL) to monetize the life-saving benefit of regulations that are expected to prevent premature deaths. Regulators use this approach in many contexts, including in regulating environmental mortality risks. This Article focuses on an underexplored dimension of such risks—their tendency to fall on people who do not benefit from the underlying risky activity. The person whose life is imperiled by breathing in pollutants emitted by a nearby factory may not benefit in any meaningful way from the factory's operations or from the general industrial activity that creates the risk. The Article asks whether, in such cases, it is normatively defensible to use VSL-based CBA in regulating the mortality risk at issue.*

*The Article argues that, when it comes to regulating environmental mortality risks, VSL-based CBA lacks a normative basis. This is so for two reasons. First, this approach does not do the normative work it purports to do as it fails to accurately capture a regulation's effect on overall well-being. Second, even if it did accurately reflect a regulation's impact on overall well-being, VSL-based CBA fails to account adequately for the way risks, costs, and benefits are distributed among differently situated groups of people.*



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## I. INTRODUCTION

A meat processing plant releases toxic chemicals into a nearby river, contaminating shellfish that local subsistence fishers consume.[1] A power plant spews nitrogen oxides into the air, adding to ground-level ozone pollution in a downwind state.[2] A municipal landfill in the United States (U.S.) emits methane, adding to the greenhouse gases dangerously warming the planet.[3]

In each of these cases, an industrial activity poses a risk of premature death to a group of individuals—subsistence fishers, residents of the state downwind of the power plant, non-U.S. residents—who may not benefit from the operations of the firm engaged in the activity.[4] All three cases,

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[1] U.S. ENV'T PROT. AGENCY, EPA-821-R-23-013, BENEFIT COST ANALYSIS FOR REVISIONS TO THE EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE MEAT AND POULTRY PRODUCTS POINT SOURCE CATEGORY 2-8 (2023). The chemicals released by meat and poultry product facilities can create a risk of paralytic shellfish poisoning. *See id.* This can be fatal if not promptly treated. *See* William Hurley et al., *Paralytic Shellfish Poisoning: A Case Series*, 15 W.J. EMERGENCY MED. 378, 380–81 (2014).

[2] Federal "Good Neighbor Plan" for the 2015 Ozone National Ambient Air Quality Standards, 88 Fed. Reg. 36654, 36656 (June 5, 2023) (to be codified at 40 C.F.R. pts. 52, 75, 78, 97). Nitrogen oxides are ozone precursors, and ozone exposure can be lethal. *See id.* at 36654, 36658. ("Acute and chronic exposure to ozone in the humans is associated with premature mortality and certain morbidity effects, such as asthma exacerbation.").

[3] U.S. ENV'T PROT. AGENCY, EPA-452/R-16-003, REGULATORY IMPACT ANALYSIS FOR THE FINAL REVISIONS TO THE EMISSIONS GUIDELINES FOR EXISTING SOURCES AND THE FINAL NEW SOURCE PERFORMANCE STANDARDS IN THE MUNICIPAL SOLID WASTE LANDFILLS SECTOR 4-4 (2016).

[4] The subsistence fishers may not consume any of the meat processing plant's products or otherwise benefit from its activities, but they face a mortality risk from consuming shellfish contaminated by chemicals the plant releases into the river. *See* U.S. ENV'T PROT. AGENCY, EPA-821-R-23-013, BENEFIT COST ANALYSIS FOR REVISIONS TO THE EFFLUENT

in other words, involve one group of people being at risk of premature death to provide benefits to different groups of people (the polluting firm's customers, employees, and shareholders). This dynamic is a characteristic feature of *environmental mortality risks*, a term I will use in this Article to refer to risks of premature death that are (1) generated by an industrial or commercial activity and (2) *not* associated with directly consuming the activity's end product (a *consumption risk*) or being employed as part of the activity's production processes (a *workplace risk*).[5] The classic environmental mortality risk is one imposed on individuals who live or work in proximity to a factory or plant that emits toxic pollutants into the surrounding air, water, or soil.

Environmental mortality risks abound in highly developed countries like the U.S.[6] Since these risks often fall on people who derive no direct benefit from the activities of the firm whose operations create the risk, many scholars have explored the moral justifiability of imposing a risk of death or other serious bodily harm in such circumstances.[7] This Article

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LIMITATIONS GUIDELINES AND STANDARDS FOR THE MEAT AND POULTRY PRODUCTS POINT SOURCE CATEGORY 2-8 (2023). Residents of the state downwind from the plant may not use electricity generated by the power plant or otherwise benefit from its activities, but they face an enhanced mortality risk from breathing air polluted by ozone resulting from nitrogen oxides the plant emits. *See* Federal "Good Neighbor Plan" for the 2015 Ozone National Ambient Air Quality Standards, 88 Fed. Reg. at 36658. Residents of other countries almost certainly derive no meaningful benefit from the operation of a municipal landfill within the U.S., but they face a heightened mortality risk from the global temperature increase caused, in part, by methane the landfill (and others like it) emit into the atmosphere. *See* U.S. ENV'T PROT. AGENCY, EPA-452/R-16-003, REGULATORY IMPACT ANALYSIS FOR THE FINAL REVISIONS TO THE EMISSIONS GUIDELINES FOR EXISTING SOURCES AND THE FINAL NEW SOURCE PERFORMANCE STANDARDS IN THE MUNICIPAL SOLID WASTE LANDFILLS SECTOR 4-4 (2016).

[5] I addressed whether it is morally justifiable to use the value of a statistical life (VSL) to guide mortality risk regulation for these consumption and workplace risks elsewhere. *See* Dov Waisman, *Moral Context and Risks of Death*, 71 ARK. L. REV. 215, 229–30, 255–57 (2018) [hereinafter Waisman, *Moral Context*]. The justifiability of using the VSL as a basis for mortality risk regulation depends on the type of mortality risk at issue and the resulting moral context. *See id.* at 219–21. I argued that using the VSL in regulating consumption-based mortality risks is defensible based on the norm of personal autonomy. *See id.* at 255. Regarding workplace risks, I argued that although using the VSL to guide risk regulation is not normatively justifiable, using the underlying notion of individual willingness-to-pay is defensible based on the norm of equity (interpreted according to a normative theory known as ex ante contractualism). *See id.* at 288–89. However, environmental mortality risks were not addressed. *See id.* at 220 n.11, 294–95.

[6] *See* W. KIP VISCUSI, PRICING LIVES: GUIDEPOSTS FOR A SAFER SOCIETY 9, 231 n.6 (2018) (observing that "the largest benefit component of all US federal regulations is the monetized [VSLs] that will be saved by the regulation" and noting that, per a report by the Office of Information & Regulatory Affairs, "[r]egulations by the [EPA] and the [US DOT] are most influential") [hereinafter VISCUSI, PRICING LIVES].

[7] *See, e.g.*, SVEN OVE HANSSON, THE ETHICS OF RISK: ETHICAL ANALYSIS IN AN UNCERTAIN WORLD 97–104 (2013); JOHN OBERDIEK, IMPOSING RISK: A NORMATIVE FRAMEWORK 142–50 (2017) (ebook) (exploring the contractualist approach); Rahul Kumar, *Risking and Wronging*, 43 PHIL. & PUB. AFFS. 27, 34–35 (2015); James Lenman, *Contractualism and Risk Imposition*, 7 POLS., PHIL. & ECON. 99, 100–01 (2008). I think the

focuses on a different question, one that has received less scholarly attention:[8] assuming it is justifiable for a firm to impose an environmental mortality risk on individuals who do not benefit from the firm's operations, *what level of risk-reducing precaution is the firm morally required to exercise with respect to that risk*?

This Article argues that a prominent approach to answering this question in a regulatory context—*cost-benefit analysis* ("CBA") focused on the *value of a statistical life* ("VSL")—is normatively unsound. This regulatory approach may be more defensible when it comes to regulating other types of mortality risks—for example, consumption-related mortality risks[9]—but it should not be used as a guide for regulating environmental mortality risks for two reasons. First, this approach does not do the normative work it purports to do as it fails to accurately capture a regulation's effect on overall well-being. Second, even if it did accurately reflect a regulation's impact on overall well-being, VSL-based CBA fails to take adequate account of the way risks, costs, and benefits are distributed among differently situated groups of persons.

Since at least the first Reagan administration, CBA has dominated federal risk regulation.[10] According to CBA, the government should issue

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best justification for imposing such a risk is that it is part of a societal practice of risk imposition that works to the advantage of those imperiled. *See infra* Part III.

[8] Some scholars have discussed the normatively appropriate level of precaution in regulating risks of serious physical harm arising from socially beneficial activities. *See, e.g.*, Gregory C. Keating, *Pressing Precaution Beyond the Point of Cost-Justification*, 56 VAND. L. REV. 653, 657–58 (2003) [hereinafter Keating, *Pressing Precaution*]; David M. Driesen, *Two Cheers for Feasible Regulation: A Modest Response to Masur and Posner*, 35 HARV. ENV'T L. REV. 313, 317–18 (2011); Barbara H. Fried, *The Limits of a Nonconsequentialist Approach to Torts*, 18 LEGAL THEORY 231, 260 (2012). But no study has extensively addressed this question in the particular context I focus on here: where the risk at issue is an environmental mortality risk that falls on individuals who neither benefit from the activities of the risk-imposing firm, nor bear any share of the costs of the firm's compliance with risk-reducing regulations.

[9] *See* Waisman, *Moral Context*, *supra* note 5, at 255 (arguing VSL-based CBA is more defensible where regulated risk is a consumption risk, since consumers benefit from the risky activity and tend to bear the costs of compliance).

[10] *See*, *e.g.,* MATTHEW D. ADLER, RISK, DEATH, AND WELL-BEING 198 (2025) ("Cost-benefit analysis (CBA) is the dominant economic methodology for evaluating governmental policies and, specifically, risk-regulation policies. . . . CBA has been the linchpin of systematic policy analysis in the US government for more than four decades and plays a major role in other governments.") [hereinafter, ADLER, RISK, DEATH, AND WELL-BEING]. Shortly after assuming office, President Reagan issued an executive order requiring federal agencies to perform CBA for all major regulations. *See* Federal Regulation, Exec. Order No. 12,291, 46 Fed. Reg. 13193 (Feb. 19, 1981). Similar orders have been issued by later administrations. *See, e.g.*, Regulatory Planning and Review, Exec. Order No. 12,866, 58 Fed. Reg. 51735 (Oct. 4, 1993) (Clinton); Improving Regulation and Regulatory Review, Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 21, 2011) (Obama); Modernizing Regulatory Review, Exec. Order No. 14,094, 88 Fed. Reg. 21879 (Apr. 11, 2023) (Biden). Cost-benefit analysis is sometimes referred to as "benefit-cost analysis." *See, e.g.*, VISCUSI, PRICING LIVES, *supra* note 6, at 9–10.

a regulation only if its total benefits exceed its total costs,[11] and regulatory decisions should be made with the goal of maximizing net benefits.[12] When the costs of a regulation are monetary, but the benefits consist in the prevention of a certain number of premature deaths, regulators convert the life-saving benefits of the regulation into the same currency as its costs by monetizing the benefit of avoiding premature death.[13] In such cases, regulators deploy a concept known as the "value of a statistical life."[14] The VSL—which currently hovers around $10

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[11] *See* MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 2 (2006) ("CBA requires the regulatory agency to sum up the costs and benefits of a proposed regulation, and issue the regulation if the benefits exceed the costs."); VISCUSI, PRICING LIVES, *supra* note 6, at 3 ("[T]he Reagan administration's Executive Order No. 12291 imposed a benefit-cost test for proposed major regulations. Agencies must show that the benefits exceeded the costs before . . . issu[ing] the regulation. This . . . requirement has remained in place through all subsequent administrations."). For a more technical statement of this point, see MATTHEW D. ADLER, WELL-BEING AND FAIR DISTRIBUTION: BEYOND COST-BENEFIT ANALYSIS 88–91 (2012) [hereinafter ADLER, WELL-BEING AND FAIR DISTRIBUTION].

[12] *See* Amy Sinden, *All the Tools in the Toolbox*: *A Plea for Flexibility and Open Minds in Assessing the Costs and Benefits of Climate Rules*, 39 YALE J. REG. 908, 918 (2022) ("Typically, formal CBA is normatively anchored in welfare economics. That is, it is defended on the ground that it identifies the optimal or economically efficient level of regulation in the Kaldor-Hicks sense. A . . . regulation [is] Kaldor-Hicks efficien[t] if those who . . . benefit from the regulation could fully compensate those who stand to lose from it and still be better off. Thus, formal CBA aims to identify the alternative that maximizes overall net social benefit to all members of society . . . ."); Michael A. Livermore & Richard L. Revesz, *Rethinking Health-Based Environmental Standards*, 89 N.Y.U. L. REV. 1184, 1190 (2014) ("[CBA], in its most general form, places both costs and benefits along a common metric and supports the standard that maximizes net benefits (the difference between benefits and costs)."); GREGORY C. KEATING, REASONABLENESS AND RISK: RIGHT AND RESPONSIBILITY IN THE LAW OF TORTS 195 (2022) ("[CBA], conventionally conceived, is efficiency embodied. Cost-justified precaution is efficient precaution. Risks to health and safety should be managed by minimizing the combined costs of avoiding and suffering the illnesses and injuries in question, thereby maximizing the net benefit that we extract from the activities responsible for the illnesses and injuries at issue.").

[13] *See* FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 61 (2004) ("The most significant benefits of environmental protection are often the deaths prevented by regulation. To decide whether the benefits of regulation [outweigh] the costs, it is essential to assign a dollar value to lives saved.") [hereinafter ACKERMAN & HEINZERLING, PRICELESS]; CASS R. SUNSTEIN, VALUING LIFE: HUMANIZING THE REGULATORY STATE 85 (2014) ("[I]n order to conduct [CBA], agencies must assign monetary values to the human lives that would be saved by a proposed regulation."]; Thomas O. McGarity, *A Cost-Benefit State*, 50 ADMIN. L. REV. 7, 63 (1998) ("Perhaps the most significant objection to [CBA] is the inability of economic analysis to reduce the benefits of regulation to dollar equivalents to compare with regulatory costs.").

[14] *See, e.g.*, ADLER, RISK, DEATH, AND WELL-BEING, *supra* note 10, at 198 ("The key concept in applying CBA to risk regulation is the so-called value of statistical life (VSL). CBA, in general, translates well-being effects on individuals into monetary equivalents. VSL, specifically, is a conversion factor that translates risk reductions into monetary equivalents."); ACKERMAN & HEINZERLING, PRICELESS, *supra* note 13, at 67 ("The standard economic response is that a value like $6.1 million is not a price on an individual's life or death. Rather, it is a way of expressing the value of small risks of death, which, when aggregated to produce one death, can be called a 'statistical life'; for example, the value of one statistical life is one million times the value of a one in a million risk."); W. Kip Viscusi,

million—is the main way federal regulatory agencies have monetized the benefits of regulations that reduce mortality risks.[15]

Researchers derive the VSL from empirical studies of the amount of money people are willing to pay to avoid (or the amount of money they are willing to accept to assume) very small mortality risks.[16] Suppose labor market studies[17] show that, on the average, individuals are willing to pay $100 to eliminate a 1 in 100,000 risk of death to which they would otherwise be subject. This implies that, were the risk imposed on 100,000 individuals, the collective willingness-to-pay to eliminate the risk, and thereby avoid one statistical death, would be $10 million ($100 multiplied by 100,000). On this basis, the data imply the value of a statistical life to be $10 million.[18] CBA can then be applied to mortality risk regulation. If

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*The Value of Life in Legal Contexts: Survey and Critique*, 2 AM. L. & ECON. REV. 195, 196–97 (2000) ("Economic discussions of the value of life . . . focus on the [VSL], considering an individual facing a very small probability of death . . . . [T]he [VSL] is a prospective measure that in effect establishes the appropriate price society is willing to pay for small risk reductions.").

[15] *See* ADLER, RISK, DEATH, AND WELL-BEING, *supra* note 10, at 204 ("CBA, as practiced in the US government with respect to risk policies, is not textbook CBA. Instead, a single, population-average value (currently on the order of $10 million) is used to monetize risk reductions."); VISCUSI, PRICING LIVES, *supra* note 6, at 28–29 ("[I]n many recent studies, the estimated VSL is often in the $9 million to $11 million range."); W. Kip Viscusi & Joseph E. Aldy, *The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World*, 27 J. RISK & UNCERTAINTY 5, 18 (2003) (concluding in a meta-study that most studies determine the VSL to lie in a range between $3.8 and $9 million and arriving at a median result of $7 million); *see also* SUNSTEIN, *supra* note 13, at 94, 215 n.4 ("The most detailed meta-study, far more comprehensive than the EPA's own analysis, identifies a central value in the general vicinity of $8 million and finds that most studies produce VSLs ranging from $3.8 million to $9 million . . . . Note that on the basis of their reading of the technical literature, agencies actually use a narrow range of $6 to $9 million, with increasing consensus in the vicinity of $9 million.") (citing Viscusi & Aldy, *supra*).

[16] *See* VISCUSI, PRICING LIVES, *supra* note 6, at 24 ("There are two principal sources of evidence that are used to establish VSL levels. It is possible to infer VSL levels based on revealed preferences regarding risky decisions or based on stated-preference values elicited in surveys . . . . [U.S.] government agencies place the greatest emphasis on revealed-preference estimates . . . ."); Michael Pressman, *Hedonic-Loss Damages That Optimally Deter: An Alternative to "Value of a Statistical Life" That Focuses on Both Decedent* and *Tortfeasor*, 72 HASTINGS L.J. 1511, 1523 (2021) ("VSL infers a price that people put on their own lives based on what people have paid or accepted in consumption and labor-force decisions—with the majority of the data coming from labor-force decisions.").

[17] *See* VISCUSI, PRICING LIVES, *supra* note 6, at 25 ("[T]he most prevalent approach to analyzing the VSL implied by actual market behavior involves the use of labor market data to estimate the VSL.").

[18] *See, e.g.*, SUNSTEIN, *supra* note 13, at 51 ("With these values, the government is not actually 'valuing life.' It is valuing the reduction of mortality risks—typically by eliminating low-level risks, for example, risks of 1 in 100,000. When it is said that a life is 'worth' $9 million in such cases, what is really meant is that people are willing to pay, or ask to be paid, $90, on average, to eliminate a risk of 1 in 100,000."); W. Kip Viscusi, *The Heterogeneity of the Value of Statistical Life: Evidence and Policy Implications*, *in* BENEFIT-COST ANALYSES FOR SECURITY POLICIES: DOES INCREASED SAFETY HAVE TO REDUCE EFFICIENCY? 78, 81 (Carol Mansfield & V. Kerry Smith eds., 2015) ("The VSL pertains to the trade-off between money and very small risks of death. Suppose there is a risk of one chance in . . . 10,000 people, so that this group will experience one expected death. If each person

a regulation that costs $12 million is expected to save one statistical life by eliminating a 1 in 100,000 risk of death to 100,000 people, CBA rejects the regulation on the grounds that it is not cost-justified, since the monetized value of the regulation's life-saving benefit is $10 million, $2 million less than its cost.

CBA reaches this same conclusion regardless of whether: (1) the mortality risk at issue is an environmental risk, a workplace risk, or a consumption risk, and (2) those subject to the risk benefit from the underlying risky activity or bear the costs of compliance with risk-reducing regulations. That is because CBA rests on the norm of *maximizing overall well-being* and purports to capture only a regulation's ultimate effect on the well-being of all affected individuals taken in the aggregate.[19] CBA regards money as a proxy for well-being: monetized benefits add to overall well-being, while monetized costs subtract.[20] Thus, a regulation whose costs exceed its benefits is unjustifiable because it leaves everyone worse off: it takes more well-being away from the world than it adds to the world, decreasing net well-being. This conclusion follows with equal force, whether or not the individuals on whom the

would be willing to pay $800 to eliminate the risk, the VSL in this instance would be $8 million, or 10,000 people x $800 per person.").

[19] *See* Sinden, *supra* note 12, at 918–19 (describing CBA as a "highly technical and formal analytic method that attempts to fully quantify and monetize all of the social costs and benefits of a whole range of alternative options and then pinpoint the optimum—that is, the level of net welfare maximization"); ADLER & POSNER, *supra* note 11, at 25, 26 ("[CBA] is a rough-and-ready proxy for overall well-being. It is an imperfect but practicable tool by which governmental decision-makers implement the criterion of overall welfare . . . . Our conclusion is that CBA is the welfare-maximizing procedure across a substantial range of governmental choice situations."); Eric A. Posner & Cass R. Sunstein, *Moral Commitments in Cost-Benefit Analysis*, 103 VA. L. REV. 1809, 1820 (2017) ("What accounts for the bipartisan (though admittedly not universal) appeal of [CBA]? The simplest answer is that human consequences matter, and [CBA] is a way of cataloguing them. Put less simply, the idea is that as a presumption, congressional grants of regulatory authority should be taken as an effort to increase people's welfare or well-being."); *cf.* ADLER, RISK, DEATH, AND WELL-BEING, *supra* note 10, at 222 ("The linchpin of CBA is the monetary equivalent. According to the well-being measure defense [of CBA], the monetary equivalent is *itself* the correct preference-based measure of individual well-being.…In short, the well-being measure defense of CBA denies any divergence between CBA and utilitarianism. The policy analyst implements utilitarianism via CBA—or so the argument goes."). Adler himself offers an account of "preference-based well-being measurement" that rejects any coincidence between utilitarianism and CBA. *See id.* at 223. He rejects what he calls the "well-being measure defense" of CBA in favor of an alternative "tax-system defense." *See id.* at 224.

[20] *See, e.g.*, ADLER, RISK, DEATH, AND WELL-BEING, *supra* note 10, at 200 ("CBA translates well-being effects on individuals into *monetary equivalents*. I use 'money' as an umbrella term, meaning some indicator of an individual's material resources.") (emphasis in original); ADLER & POSNER, *supra* note 11, at 13 ("In simple terms, CBA is a device for converting the utility losses and gains from a project or regulation into dollar values, and aggregating."); Posner & Sunstein, *supra* note 19, at 1820, 1822 ("The key requirement of [CBA] is that the positive and negative effects of the regulation must be translated into the common metric of money (to the extent feasible)."); ADLER, WELL-BEING AND FAIR DISTRIBUTION, *supra* note 11, at 91.

mortality risk falls benefit from the activity that gives rise to the risk or bear the costs of complying with risk-reducing regulations.

When it comes to regulating environmental mortality risks, this approach goes wrong on two counts. First, as explained in Part IV, the normative justification for VSL-based CBA fails on its own terms because the VSL does not accurately capture the well-being loss associated with premature death. When a mortality risk is imposed on a large group of people, two welfare-related setbacks occur. Every individual who is exposed to the risk suffers a setback to a welfare-related interest, namely, the interest in avoiding exposure to risks of premature death. In addition, any individual who is killed when the risk materializes suffers the well-being loss associated with premature death, i.e., the loss of the well-being they would have enjoyed had they not died prematurely. The VSL does a reasonably good job of monetizing the first of these welfare-related setbacks, at least arguably. It does not, however, persuasively capture the second one.

Second, even if the VSL did accurately monetize all the welfare-related setbacks associated with imposing a low mortality risk on a large group of people, VSL-based CBA would still fail as a normative basis for regulating environmental mortality risks. That is because, as explained in Part V, CBA purports to consider only a regulation's effects on overall well-being and ignores how the risks, costs, and benefits associated with a regulation are distributed among differently situated groups of people.[21] CBA does not register the intuitive moral difference between imposing a cost on Group A for the sake of providing a compensating benefit to Group A and imposing a cost on Group A for the sake of providing a benefit to Group B.[22] The latter situation is morally problematic, since there is a clear sense in which the interests of one group are being sacrificed to promote the interests of a different group.[23] And environmental mortality

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[21] *See* Richard L. Revesz & Samantha P. Yi, *Distributional Consequences and Regulatory Analysis*, 52 ENV'T L. 53, 55 (2022) ("Cost-benefit analysis focuses only on aggregate costs and aggregate benefits. It does not take account of who bears these costs and benefits. For example, a regulation reducing the emissions of an air pollutant could be cost-benefit justified if its benefits outweigh its costs, even if all the emissions reductions benefit a high-income, white neighborhood and all the costs are borne by a low-income, minority neighborhood.").

[22] *See* HANSSON, *supra* note 7, at 26–27 ("[CBA] is in fact the major form of applied utilitarianism. . . . (Expected) utilities and disutilities that pertain to different individuals are added up, with no respect being paid to the fact that they refer to different persons. In this way, a disadvantage affecting one person can always be justified by a sufficiently large advantage to some other person.").

[23] *Id.* at 98 ("Everyday moral reasoning does not in general allow gains for one person to cancel out losses for another. I am not allowed to inflict even a minor loss on you against your wish in order to achieve a larger gain for myself or for some third person."); *cf.* JOHN RAWLS, A THEORY OF JUSTICE 3–4 (1971) ("Each person possesses an inviolability founded on justice that even the welfare of society as a whole cannot override. For this reason justice denies that the loss of freedom for some is made right by a greater good shared by others. It does not allow that the sacrifices imposed on a few are outweighed by the larger sum of advantages enjoyed by many."); Lenman, *supra* note 7, at 100 ("[C]ontractualism contrasts with rival utilitarian views in insisting that we may not simply aggregate costs and benefits

risks tend to exhibit just this distributive structure, as they often fall on individuals who benefit neither from the risky activity itself nor from the monetary savings resulting from a decision not to regulate the risk with maximal stringency.[24] But CBA is blind to such distributive concerns. Under CBA, the two situations are identical, assuming that the magnitude of the costs and benefits are the same in each. From a moral point of view, however, the situations are importantly different. A normative procedure that fails to take account of this difference is deficient in a significant respect.

VSL-based CBA also fails to register the impact of a risk regulation at the individual level, as it is founded on the aggregation of welfare impacts across persons.[25] For this reason, *contractualism*, a theory of normative ethics focusing on impacts to differently situated individuals, does not support VSL-based CBA. A complete normative analysis should register both a regulation's aggregate impact on overall well-being *and* its impact on the well-being of representative individuals from each affected group. By focusing on the former, CBA implausibly countenances a regulatory decision that imposes a significant extra mortality risk on each risk-bearer for the sake of providing trivial monetary benefits to each of a large group of cost-bearers.

Fortunately, in actual practice, the Environmental Protection Agency ("EPA") does not solely rely on VSL-based CBA to regulate environmental mortality risks. For one thing, some environmental laws require that regulatory levels follow safety-based or feasibility-based standards, rather than formal CBA requirements.[26] In such cases, CBA informs EPA's determination of what regulatory action meets the applicable regulatory standard, rather than directly dictating the regulatory action.[27] Further, EPA has explicitly recognized certain limitations of VSL-based CBA, including its insensitivity to distributional concerns and to individual-level impacts.[28] EPA attempts to take account of these factors by performing more analyses—including economic impacts analysis, regulatory impact analysis, and environmental justice analysis—that purport to capture a regulation's distributive implications

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to different persons and seek to maximize this aggregate. Harm to you cannot be straightforwardly compensated by benefits to me.").

[24] *See* HANSSON, *supra* note 7, at 97 ("It does not seem possible for a human society to avoid situations in which benefits for some persons lead to risks for others.").

[25] *See* Matthew D. Adler, *Benefit-Cost Analysis and Distributional Weights: An Overview*, 10 REV. ENV'T ECON. & POL'Y 264, 264 (2016), ("[CBA] evaluates governmental policies by summing individuals' monetary equivalents, and is insensitive to distributional concerns.").

[26] *See* sources cited *infra* Part II, at notes 64–68, 75–85.

[27] *See Mortality Risk Valuation,* U.S. ENV'T PROT. AGENCY, www.epa.gov/environmental-economics/mortality-risk-valuation [https://perma.cc/KEK5-MHUQ] (last visited Oct. 12, 2025) ("Most environmental laws do not require benefit-cost analysis, and some prohibit it (e.g., the air quality standards provisions of the Clean Air Act). Nevertheless, Presidential Executive Orders have required or encouraged the use of benefit-cost analysis in policy evaluation since the early 1980's.").

[28] *See infra* note 69.

by focusing on its expected impact on particular industries, firms, markets, consumers, governmental entities, and demographic groups.[29]

Despite these limitations on how EPA deploys VSL-based CBA in regulating environmental mortality risks, this Article argues that its use remains problematic. As noted above, VSL-based CBA fails to capture the welfare impacts it purports to capture. Moreover, despite its commendable attempt to address distributional concerns with alternative kinds of analyses, EPA does not appear to systematically take account of the two core distributional issues that are the focus of this Article: (1) to what extent, if any, do those placed at risk of premature death benefit from the risky activity being regulated? and (2) to what extent, if any, do those placed at risk of premature death bear the costs of compliance with risk-reducing regulations? These two questions have a strong normative bearing on how mortality risks should be regulated. Yet EPA seems not to directly address either one in its formal CBA or in any alternative analysis it regularly performs.

This Article proceeds in five parts. Part II provides factual and theoretical background for my analysis. Part III explores what I take to be the first and most basic question in the normative analysis of environmental mortality risks: under what circumstances, if any, is it morally permissible to impose a risk of death on one group of people for the sake of providing a benefit to a different group of people? I then turn to the Article's central question: assuming it is morally permissible for a firm to impose an environmental mortality risk on individuals who do not benefit from the firm's operations, what level of risk-reducing precaution is the firm morally required to exercise? Part IV argues that VSL-based CBA fails on its own terms as an answer to this question because it does not accurately monetize the welfare loss associated with premature death. Part V argues that, even assuming the VSL did accurately reflect the welfare loss associated with premature death, VSL-based CBA would still fail as a reliable normative guide for regulating environmental mortality risks because it ignores the morally relevant consideration of how the risks, costs, and benefits associated with a regulation are distributed among differently situated groups of people. Part VI draws on a theory of normative ethics known as *contractualism* to argue that VSL-based CBA also fails to account adequately for regulatory impacts at the individual level.

## II. FACTUAL AND THEORETICAL BACKGROUND

### *A. Example of Environmental Mortality Risk: Polluted Wastewater from Steam Electric Power Plants*

Steam electric power plants—power plants that use steam to drive turbines connected to electric generators—discharge wastewater

[29] *See infra* notes 70–71.

containing large quantities of pollutants into U.S. waters.[30] The pollutants, which include toxic metals such as mercury, arsenic, lead, and selenium, accumulate in fish and contaminate drinking water, creating a risk of negative health effects for people who consume the fish or drink the water.[31] The adverse health effects "can include cancer, cardiovascular disease, neurological disorders, kidney and liver damage, and lowered IQs in children."[32] As of 2009, the EPA estimated that there were 1,080 steam electric power plants operating in the U.S.[33] These plants represent about 19% of the total number of power generation plants in the U.S., but about 70% of the nation's total electric generating capacity.[34]

Under the Clean Water Act, the EPA may establish national technology-based effluent limitations and new source performance standards for discharges made by industrial, commercial, or public sources directly into U.S. waters.[35] In 2009, the EPA updated its requirements for wastewater emissions generated by steam electric power plants.[36] As part of that process, the EPA performed a CBA of six different regulatory options of increasing stringency.[37] In its CBA, EPA identified several benefits of the new regulation, one being "human health

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[30] *Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category*, 80 Fed. Reg. 67838, 67839 (Nov. 3, 2015) (to be codified at 40 C.F.R. pt. 423) [hereinafter *Effluent Limitations Guidelines*]. Per the EPA, such discharges "account for about 30 percent of all toxic pollutants discharged into surface waters by all industrial categories regulated under the CWA." *Id.* at 67839–67840.

[31] *Id.* at 67840.

[32] *Id.*

[33] U.S. ENV'T PROT. AGENCY, EPA-821-R-15-005, BENEFIT AND COST ANALYSIS FOR THE EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY, 1-2 (2015) [hereinafter BENEFIT AND COST ANALYSIS].

[34] U.S. ENV'T PROT. AGENCY, EPA-821-R-15-004, REGULATORY IMPACT ANALYSIS FOR THE EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY, 1-2 (2015) [hereinafter REGULATORY IMPACT ANALYSIS].

[35] *Effluent Limitations Guidelines*, 80 Fed. Reg. at 67842.

[36] *Id.* at 67840 ("The steam electric [effluent limitations guidelines] that EPA promulgated and revised in 1974, 1977, and 1982 are out of date. They do not adequately control the pollutants (toxic metals and other) discharged by this industry, nor reflect relevant . . . advances [from] the last 30-plus years."). The EPA completed a study of the steam electric power plant in 2009 and proposed the effluent limitations guidelines (ELG) rule for public comment in 2013. *Id.* at 67841.

[37] *See* BENEFIT AND COST ANALYSIS, *supra* note 33, at 1-2 to 1-5. EPA noted that "the regulatory options differ in the technology basis used to determine effluent limits and standards for different wastestreams." *Id.* at 13-2. EPA ultimately included only five of the six regulatory options in its complete analysis for existing sources. *Id.* at 1-3. EPA excluded the sixth option—so-called "Option F"—from its existing sources analysis "due primarily to the high cost of that option, particularly in light of the costs associated with other rulemakings expected to impact the steam electric industry." *Id.*

benefits."[38] In detailing such benefits, EPA began by discussing the "affected population," defined as those "individuals potentially exposed to steam electric pollutants via consumption of contaminated fish tissue."[39] EPA identified the affected population as "recreational anglers and subsistence fishers who fish reaches affected by steam electric discharges (including receiving and downstream reaches), as well as their household members."[40]

Of all the human health benefits from the new regulation, EPA noted that "the most important . . . benefits stem from reduced risk of illness associated with the consumption of water, fish, shellfish, and other aquatic organisms . . . from waterways affected by steam electric discharges."[41] Some of the adverse health impacts EPA identified—e.g., neurological and cognitive damage to children resulting from lead exposure in fish and water or skin cancer caused by arsenic exposure—were assumed not to be fatal.[42] EPA thus did not employ the VSL in monetizing the benefit associated with reducing the risks of those non-fatal impacts.

But at least one adverse health effect—cardiovascular disease caused by lead exposure—posed a risk of premature death.[43] For that risk, EPA employed the VSL to monetize the associated risk reduction benefit.[44] In its CBA, EPA calculated the monetized benefit from avoided deaths for each of the five regulatory options considered.[45] Unsurprisingly, the monetized benefit was highest for the two most stringent regulatory options, Options D and E, both of which would yield an annualized death avoided benefit of $12.8 million.[46] When *all* types of

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[38] *See id.* at 2-3 to 2-5. The other types of benefits produced by the regulation included ecological benefits associated with improvements in surface water quality, economic productivity benefits, and reduced water withdrawals. *Id.* at 2-5, 2-9, 2-13.

[39] *See id.* at 3-2.

[40] *Id.* EPA observed that the health risks posed to subsistence fishers are greater than those posed to recreational anglers. *See id.* at 14-6 ("Subsistence fishers consume more self-caught fish than recreational anglers and can therefore be expected to experience higher health risks associated with steam electric pollutants in fish tissue.").

[41] *Id.* at 2-3.

[42] *Id.* at 3-9 (noting that benefits from reducing childhood lead exposure were avoided IQ loss and lower need for special education); *id.* at 3-17 (taking a Cost of Illness approach to monetizing benefit of avoided skin cancer cases due to reduced arsenic exposure because "the majority of skin cancer cases . . . are not fatal")

[43] *See id.* at 3-10 ("[R]ecent evidence has suggested that exposure to lead in adults can result in [cardiovascular disease] impacts; specifically, increases in hypertension [and] coronary heart disease.").

[44] *Id.* ("EPA estimated monetized benefits by applying a constant [VSL] to the estimated number of premature deaths avoided in each analysis year.").

[45] *Id.* at 13-2 ("[D]ifference[s] in benefits and costs across the options derive[] from the characteristics of the wastestreams controlled by an option, the relative effectiveness of the control technology in reducing pollutant loads, and the distribution and characteristics of steam electric power plants that would implement the technologies and of the receiving waterbodies.").

[46] *See id.* at 3-14. This annualized benefit was calculated from 2019 to 2042. *Id.* The $12.8 million annualized benefit for this period for Options D and E assumes a discount rate

benefits were considered, including human health benefits and others, Options D and E were also found to deliver the greatest total monetized benefits out of all five regulatory options considered.[47]

Thus, the cardiovascular disease risk in this regulation is a good example of an environmental mortality risk. It is a risk of premature death generated by toxic pollution from firms engaged in a particular industrial activity, namely, the operation of steam electric power plants. Crucially, the risk falls on a group of individuals—recreational anglers and subsistence fishers—who may not benefit from the polluting firm's activity, whether as consumers, workers, or shareholders. It is at least possible, if not probable, that the anglers and fishers exposed to a mortality risk from a given firm's polluted wastewater would not themselves be customers, employees, or shareholders of that firm and would not otherwise benefit in any direct or meaningful way from the firm's activities. Further, assuming the anglers and fishers exposed to the risk were not consumers, employees, or shareholders of the polluting firm, they would not bear any share of the costs of the firm's compliance with risk-reducing regulations.

With regard to costs, EPA's CBA began with a broad definition: "the *costs* of regulatory actions are the *opportunity costs* to society of employing resources to prevent the environmental damage otherwise occurring from discharges of wastewater containing metals, nutrients, and other pollutants."[48] "The costs to society," it continued, "are the full value of the resources used, whether they are paid for by the regulated plants, by taxpayers in the form of lost tax revenues, or by some combination."[49] EPA determined that the two options with the greatest benefits—Options D and E—were also the most costly, with Option D imposing costs of $479.5 million (using a 3% discount rate) or $471.2 million (using a 7% discount rate) and Option E imposing costs of $536 million (using a 3% discount rate) or $525.8 million (using a 7% discount rate).[50] Costs of regulatory compliance could conceivably be passed on to consumers in the form of price increases, to workers in the form of layoffs or wage cuts, or to shareholders in the form of reduced profits.[51] In its

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of 3%. *Id.* If a 7% discount rate were used, the annualized benefit falls to $10.68 million. *Id.* EPA used a VSL of $8.548 million in its CBA. *Id.* at F-3. When EPA conducted its CBA in 2015, EPA guidelines recommended use of a VSL of $7.9 million (in 2008 dollars). *See* U.S. ENV'T PROT. AGENCY, EPA 240-R-10-001, GUIDELINES FOR PREPARING ECONOMIC ANALYSES 7-8 (2010).

[47] *See* BENEFIT AND COST ANALYSIS, *supra* note 33, at 13-1 to 13-2.

[48] *Id.* at 12-1 (emphasis in original).

[49] *Id.*

[50] *See id.* at 12-2.

[51] *See* GUIDELINES FOR PREPARING ECONOMIC ANALYSES, *supra* note 46, at 1-5 ("Social cost analyses attempt to estimate the total welfare costs, net of any transfers, imposed by environmental policies. In most instances, these costs are measured by higher costs of consumption goods for consumers and lower earnings for producers and other factors of production."); *id.* at 9-5 to 9-6 ("Predicted impacts on prices form the basis for determining how compliance costs are distributed between the directly-affected firms, their customers, and other related parties in a typical market. At one extreme, regulated firms may not be

Regulatory Impact Analysis, EPA determined that the final rule it adopted was likely to lead to an increase in electricity prices for residential households, although a very modest one ($1.42 per year, on average nationally).[52] With regard to employment impacts, EPA concluded that the steam electric power plant regulation was likely to have both positive and negative impacts on employment, but that any such impacts were likely to be small.[53]

Based on its CBA and other analyses for existing sources of polluted wastewater, EPA selected regulatory Option D, the second-most-costly option[54] and one of two with the highest mortality risk reduction benefit, as the basis for its Final Rule.[55] For each option, EPA specified a range of possible values for monetized benefits and a single value for monetary costs.[56] It also specified benefits and costs under two alternative discount rates: 3% and 7%.[57] Using a 3% discount rate, the range of benefits for Option D was $450.6 million to $565.6 million and the cost was $479.5 million.[58] The middle value of the benefit range was $463.0 million, $16.5 million less than the cost.[59] Using a 7% discount rate, the range of monetized benefits was $387.3 million to $478.4 million and the cost was $471.2 million.[60] The middle value of the range was $397.0 million, $74.2 million less than the cost.[61] Thus, for Option D, whether it passed the cost-benefit test (i.e., whether its benefits exceeded the costs) would depend on where in the range the actual monetized benefits fell. Using the middle value of the specified range of monetized benefits, the total

able to raise prices at all, and would consequently bear the entire burden of the added costs in the form of reduced profits . . . . At the other extreme, firms may be able to raise prices enough to recover costs fully. In this case, there is no impact on the profitability of the directly-affected firms but their customers bear the burden of increased prices. Assuming perfect competition, the amount of price pass-through depends on the relative elasticity of supply and demand. Another economic impact to consider is the potential backward shifting of regulatory costs (e.g., lowering wages of workers).”). It is possible, however, for a regulation to result in increased demand for labor and so lead to positive employment effects like increased hiring, rather than negative effects like layoffs or wage reductions. *See* REGULATORY IMPACT ANALYSIS, *supra* note 34, at 6-1.

52 *See* REGULATORY IMPACT ANALYSIS, *supra* note 34, at 7-7.

53 *See id.* at 6-12.

54 *See* BENEFIT AND COST ANALYSIS, *supra* note 33, at 12-2.

55 *See id.* at 3-14. However, for new sources, EPA selected Option F, which it had excluded from the CBA it performed for existing sources. *See id.* at 1-2 to 1-3.

56 BENEFIT AND COST ANALYSIS, *supra* note 33, at 13-3. Table 13-2 shows one value for monetary costs as “Total Social Costs” and a range of values for monetized benefits as “Net Annual Monetized Benefits.” *Id.*

57 *Id.*

58 *Id.* at 13-1.

59 *See id.*

60 *Id.* at 13-2.

61 *See id.*

costs of Option D exceeded its total benefit,[62] although that was the case for most of the other regulatory options as well.[63]

What, then, explains EPA's decision to adopt a final rule whose costs may well have exceeded its benefits, particularly when other regulatory alternatives it studied may have been more likely to be cost-justified? The primary explanation is that, although EPA is required to conduct a CBA for all major regulations, it is not required (or even permitted) to follow the dictates of formal CBA if another law requires that regulatory levels be fixed to some alternative standard.[64] In the case of the steam electric power plant wastewater regulation, the Clean Water Act required that the effluent limitations guidelines be set according to several alternative standards that differ from strict CBA.[65] These alternative standards include adherence to the "Best Practicable Control Technology Currently Available," the "Best Conventional Pollutant Control Technology," the "Best Available Technology Economically Achievable," the "Best Available Demonstrated Control Technology," and pretreatment standards for both new and existing sources.[66] Whereas some of those standards contemplate weighing costs against benefits,[67] none mandate the sort of formal quantitative cost-benefit comparison that CBA does. Consideration of these alternative standards drove EPA to adopt Option D, notwithstanding that Option D may not have been the most cost-justified option of those EPA considered.[68] That choice illustrates an important point about the place of VSL-based CBA in EPA's regulatory decision process: the function of CBA may often be to *inform* EPA's

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[62] *See id.* ("EPA estimates that the annual monetized costs exceed the mid-range annual monetized benefits for the final ELG by $16.5 million using a 3 percent discount rate and $74.2 million using a 7 percent discount rate.").

[63] *See id.* at 13-1 to 13-2 (showing only two regulatory scenarios in which the mid-range extrapolated benefit of the regulatory option exceeded its total costs: Option A and Option C using a 3% discount rate).

[64] *See* Regulatory Planning and Review, Exec. Order No. 12,866, *supra* note 10, at 51735–36 (providing that regulatory agencies must engage in CBA "to the extent permitted by law and where applicable"); *see also Mortality Risk Valuation*, *supra* note 27 ("Only one federal environmental statute, the Safe Drinking Water Act, explicitly calls for the kind of formal benefit-cost analysis describe[d] here. Most environmental laws do not require benefit-cost analysis, and some prohibit it (e.g., the air quality standards provisions of the Clean Air Act). Nevertheless, Presidential Executive Orders have required or encouraged the use of benefit-cost analysis in policy evaluation since the early 1980s.").

[65] *See Effluent Limitations Guidelines*, 80 Fed. Reg. 67838, 67843 (Nov. 3, 2015) (to be codified at 40 C.F.R. pt. 423).

[66] *See id.* (capitalizations in original); *see also* REGULATORY IMPACT ANALYSIS, *supra* note 34, at 1-5 to 1-7 (summarizing CWA technology-based standards—BPT, BCT, BAT, NSPS/BADCT—and pretreatment standards for existing and new sources).

[67] *See, e.g.*, REGULATORY IMPACT ANALYSIS, *supra* note 34, at 1-5 (noting that the best practicable control technology currently available standard requires EPA to consider "the cost of achieving effluent reductions in relation to the effluent reduction benefits," and the best conventional pollutant control technology standard requires EPA to consider a "two-part cost-reasonableness" test).

[68] *See Effluent Limitations Guidelines*, 80 Fed. Reg. at 67848–67863 (discussing and applying technology- and feasibility-based regulatory standards).

determination of what regulatory action meets the applicable regulatory standard, rather than to directly *dictate* the regulatory action.

Additionally, EPA has to some extent recognized the limitations of VSL-based CBA itself, including its insensitivity to distributional concerns and to regulatory impacts at the individual level.[69] For this reason, as part of its regular practice in making regulatory decisions, EPA conducts not only a formal CBA of the regulatory alternatives, but also (1) an *economic impacts analysis*—which examines a regulation's impact on particular industries, firms of different sizes, markets, consumers, government entities, and non-profit organizations—and (2) a *distributional analysis* (also known as an *equity assessment* or *environmental justice analysis*)—which examines the regulation's effect on specific demographic groups, particularly more vulnerable or disadvantaged ones like low-income individuals, minority groups, indigenous populations, children, and the elderly.[70] However, according to EPA's *Guidelines for Preparing Economic Analyses*, neither of those analyses requires EPA to address the key distributional questions with which this Article is concerned: (1) to what extent, if any, do those exposed to the regulated health risks benefit from the regulated activity?; and (2)

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[69] *See Mortality Risk Valuation*, *supra* note 27 ("[T]he benefit-cost criterion does not consider the distribution of benefits and costs among the affected individuals. These distributional effects often will be important to policy-makers and the general [public], so benefit-cost analysis typically will need to be supplemented by other information . . . . Other factors include ethical concerns; enforceability; legal consistency; and technological and institutional feasibility."); GUIDELINES FOR PREPARING ECONOMIC ANALYSES, *supra* note 46, at 1-5 ("The assumptions and modeling framework developed for the [benefit-cost analysis] can describe gains and losses to assess efficiency. However, the [benefit-cost analysis] framework often limits detailed examination of the gainers and losers and the impacts on disadvantaged sub-populations."); *id.* at 10-1 ("Evaluating a regulation's distributional effect is an important complement to benefit-cost analysis. Rather than focusing on quantifying and monetizing total benefits and costs, economic impact and distributional analyses examine how a regulation allocates benefits, costs and other outcomes across populations or groups of interest."); *see generally* Revesz & Yi, *supra* note 21, *passim* (explaining and critiquing EPA's approach to considering distributional consequences of environmental regulations).

[70] *See* GUIDELINES FOR PREPARING ECONOMIC ANALYSES, *supra* note 46, at 1-4 to 1-5, 9-1. An economic impact analysis "identifies the specific entities that benefit from or are harmed by a policy, and then estimates the magnitude of their gains and losses including changes in profitability, employment, prices, government revenues or expenditures, and trade balances" and "can measure a broad variety of impacts, such as direct impacts on individual plants, whole firms, and industrial sectors, as well as indirect impacts on consumers and suppliers." *Id.* at 9-1. An environmental justice analysis "considers the distribution of environmental quality and human health risks across several populations: . . . (i.e., minority, low-income, or indigenous populations); children; and the elderly." *Id.* at 10-1. Some Presidential Executive Orders direct regulatory agencies to consider and address the impact of regulatory actions on specific vulnerable groups, including low-income communities, minority communities, children, and indigenous populations. *Id.* at 10-2 to 10-3.

to what extent, if any, do those exposed to the regulated health risks shoulder the costs of regulatory compliance?[71]

Consistent with this practice of conducting supplementary analyses, in its regulation of wastewater from steam electric power plants, EPA conducted both a regulatory impact analysis[72] —which addressed the proposed regulation's effect on national electricity markets, electricity prices, employment in various industries, and small business entities— and an environmental justice analysis—which addressed how the regulation's health benefits were distributed among subsistence fishers, recreational anglers, low-income individuals, and minorities.[73] However, no EPA analysis addressed the extent to which the subsistence fishers and recreational anglers exposed to health risks benefited from the activity of steam-powered generation of electricity or paid the costs of compliance with risk-reducing regulations.[74]

### *B. Regulatory Options in U.S. Law: What Is the Alternative to VSL-Based CBA?*

Given this Article's thesis that using VSL-based CBA to regulate environmental mortality risks is normatively indefensible, the question arises what the regulatory alternatives are. If we reject VSL-based CBA, what regulatory approach should be used in its place? One alternative is always to prohibit firms from engaging in the risky activity altogether, but for reasons explained in Part III, that will often be to no one's benefit, including those whose lives the activity puts at risk. If one rejects VSL-based CBA, what other regulatory standard might regulators look to when it comes to environmental risks of premature death?

Three major regulatory approaches exist in U.S. law: CBA, feasibility analysis, and health- and safety-based regulation.[75] CBA—the approach

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[71] *See generally id.* at 9-1 to 9-18, 10-1 to 10-24 (making no mention of whether those exposed to health risks benefit from the underlying risky activity or pay the costs of complying with risk-reducing regulations).

[72] *See generally* REGULATORY IMPACT ANALYSIS, *supra* note 34, at 1-1 (2015) (outlining EPA's analysis of economic impacts of final ELGs and other pertinent information). EPA concluded that the regulation would lead to a modest increase in household electricity prices and would have small effects, both positive and negative on employment. *Id.* at 6-12, 7-4, 7-8 to 7-9.

[73] *See* BENEFIT AND COST ANALYSIS, *supra* note 33, at 14-1 to 14-8 (presenting environmental justice as a component of EPA's CBA). The environmental justice analysis focused on how the health risks being regulated and the benefits of the regulation would be distributed among subsistence fishers, recreational anglers, low-income individuals, and minority individuals. *See id.* EPA concluded that "the distribution of avoided adverse health outcomes and benefits suggests that poor and minority communities may receive a greater share of the benefits from the final [effluent limitations guidelines] than their representation in the *affected* populations" and the "final ELGs may thus help redress environmental inequities that may be present in the baseline." *Id.* at 14-7 (emphasis added).

[74] *See supra* notes 72–73 and accompanying text.

[75] *See* Dov Waisman, *Equity and Feasibility Regulation*, 50 U. RICH. L. REV. 1263, 1263, 1263 n.1 (2016) [hereinafter Waisman, *Equity and Feasibility*].

that has dominated regulatory policy since the Reagan administration—says to reduce risks to the point at which net social benefits would be maximized.[76] That is, CBA says to invest in risk reduction up to (but not past) the point at which further investment would cost more than it would be expected to save in accident costs.[77] Feasibility analysis—the approach required by parts of the Clean Air Act of 1970, the Clean Water Act of 1972, and the Occupational Safety and Health Act of 1970—says to reduce risks to the maximum extent possible without threatening the existence or competitive stability of regulated industries.[78] Health- or safety-based regulation—an approach found in parts of the Clean Air Act, the Federal Water Pollution Control Act of 1972, and the Food Quality Act of 1996—requires risks to be eliminated or reduced to a specified level, regardless of cost or impact on regulated industries.[79]

When it comes to regulating environmental mortality risks, the primary alternatives to VSL-based CBA are feasibility analysis and the health- or safety-based approach.[80] While that may not always be the case, both approaches typically dictate a more stringent level of regulation than CBA will.[81] The feasibility approach is necessarily industry-preserving, requiring that risk regulation not threaten the survival of the regulated industry.[82] The health- or safety-based approach, however, is insensitive to both a regulation's cost and economic impact, so it could, in theory, require a level of regulation so stringent and costly as to bankrupt the regulated industries.[83]

A complete evaluation and defense of these alternative regulatory standards lies beyond this Article's scope. But I have given elsewhere a qualified defense of the feasibility approach,[84] which I believe to be the best alternative to VSL-based CBA for environmental mortality risks.[85]

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[76] *See supra* Part I (explaining the CBA approach including government regulations and regulatory decision making).

[77] *Id.*

[78] *See* David M. Driesen, *Two Cheers for Feasible Regulation: A Modest Response to Masur and Posner*, 35 HARV. ENV'T L. REV. 313, 316–17 (2011); Keating, *Pressing Precaution*, *supra* note 8, at 687–97; Waisman, *Equity and Feasibility*, *supra* note 75, at 1263, 1268–73 (covering feasibility-based regulations enacted under the Clean Water Act and the Clean Air Act).

[79] *See* Keating, *Pressing Precaution*, *supra* note 8, at 685–86; Waisman, *Equity and Feasibility*, *supra* note 75, at 1263 n.1, 1320 n.209.

[80] *See* Waisman, *Equity and Feasibility*, *supra* note 75, at 1263, 1263 n.1.

[81] *See* Keating, *Pressing Precaution*, *supra* note 8, at 683–85.

[82] *See* Driesen, *supra* note 78, at 314.

[83] *See* Keating, *Pressing Precaution*, *supra* note 8, at 685; Waisman, *Equity and Feasibility*, *supra* note 75, at 1320–21.

[84] *See generally* Waisman, *Equity and Feasibility*, *supra* note 75 (discussing the feasibility analysis approach and its strengths, weaknesses, and applicability).

[85] Other commentators have reached a similar conclusion. *See* Keating, *Pressing Precaution*, *supra* note 8, at 747; Driesen, *supra* note 78, at 314; *see also* Amy Sinden, Douglas A. Kysar & David M. Driesen, *Cost Benefit Analysis: New Foundations on Shifting Sand*, 3 REGUL. & GOVERNANCE 48, 63–64 (2009) ("Feasibility analysis more comprehensively considers aspects of welfare that are central to environmental regulation [compared to CBA]."). *But see* Jonathan S. Masur & Eric A. Posner, *Against Feasibility*

This Article does not make a positive case for feasibility-based regulation of environmental mortality risks, but my critique of VSL-based CBA provides indirect support for it.

### *C. Normative Pluralism*

The theoretical basis of this Article's argument is a theory of normative ethics known as *normative pluralism*. This theory provides that moral judgments depend on multiple norms and rejects the idea that any one norm—e.g., maximizing overall well-being—can adequately explain the moral rightness or wrongness of all actions.[86] Normative pluralism permits multiple normative factors—including overall well-being, deontological constraints and options, rights, contractualist considerations, fairness, and personal autonomy—to ground moral judgments.[87]

Normative pluralism is a popular position among moral philosophers[88] and legal theorists interested in CBA and risk

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*Analysis*, 77 U. CHI. L. REV. 657, 712 (2010) (coming to the opposite conclusion that there is "no reason for agencies to use feasibility analysis").

[86] *See, e.g.,* Elinor Mason, *Value Pluralism*, STAN. ENCYCLOPEDIA OF PHIL. (June 4, 2023), https://plato.stanford.edu/archives/sum2023/entries/value-pluralism/ [https://perma.cc/63FQ-RPWQ] ("Foundational pluralism is the view that there are plural moral values at the most basic level—that is to say, there is no one value that subsumes all other values, no one property of goodness, and no overarching principle of action."); William Twining, *Normative and Legal Pluralism: A Global Perspective*, 20 DUKE J. COMPAR. & INT'L L. 473, 477 (2010) ("In ethics, typically contrasted with monism, pluralism is a normative concept, referring to a 'theory or system that recognizes more than one ultimate substance or principle.'").

[87] *See, e.g.,* SHELLY KAGAN, NORMATIVE ETHICS 294 (1998) (recognizing possibility of pluralism "with more than one basic normative factor possessing intrinsic moral significance" after discussing a variety of such factors, including well-being, deontological constraints and options, and rights). (Normative pluralism is often tied to intuitionism. *See, e.g.*, RAWLS, *supra* note 23, at 34 ("Intuitionist theories . . . have two features: first, they consist of a plurality of first principles which may conflict to give contrary directives . . . and second, they include no explicit method, no priority rules, for weighing these principles against one another: we are simply to strike a balance by intuition, by what seems to us most nearly right.").

[88] *See, e.g.*, SHELLY KAGAN, NORMATIVE ETHICS 72, 80–81 (1998) (noting possibility of coherent normative pluralism as to wrong-making properties when discussing deontological constraints and moderate ("threshold") deontology); Johann Frick, *Contractualism and Social Risk*, 43 PHIL. & PUB. AFFS. 175, 219, 221–22 (2015) (proposing a "pluralist account of moral rightness" that embraces considerations of equity and well-being); 3 TERENCE IRWIN, THE DEVELOPMENT OF ETHICS: A HISTORICAL AND CRITICAL STUDY 690, 906 (2009) (noting that both W.D. Ross and the 18th century moral philosopher Richard Price accept a "pluralist view" that posits a "pluralism about ultimate moral principles," "none of which is always prior to the others."); Elinor Mason, *Value Pluralism*, STAN. ENCYCLOPEDIA OF PHIL. (June 4, 2023), https://plato.stanford.edu/archives/sum2023/entries/value-pluralism/ [https://perma.cc/63FQ-RPWQ] (noting that, in addition to the prominent early 20th-century moral philosopher W.D. Ross, many contemporary moral philosophers are committed to foundational normative pluralism, including Judith Jarvis Thomson, Bernard Williams, Charles Taylor, and Michael Stocker).

regulation.[89] This Article argues in Parts II through VI that several normative factors are relevant in determining whether imposing an environmental and mortality risk is morally permissible, and with respect to such risk, what level of risk-reducing precaution is morally required. The most salient factors to be considered are overall well-being, deontological constraints, rights, and contractualist considerations.[90]

When normative factors conflict, a normative pluralist would assess the *strength* of those competing considerations.[91] If, for example, rights-based considerations weigh strongly in favor of a particular course of action, and considerations of overall well-being weigh only weakly against it, normative pluralism would likely find that course of action morally permissible.[92] The harder cases, of course, are those in which the conflicting normative considerations are roughly equal in strength. I believe normative pluralists should resist the temptation to deploy a rigid algorithm or decision rule to resolve such cases but should instead rely on a considered judgment made after reflection and deliberation. [93]

## III. THE JUSTIFIABILITY OF IMPOSING ENVIRONMENTAL MORTALITY RISKS

While this Article focuses on the question of what level of precaution is morally required when imposing an environmental mortality risk, this Part addresses a more foundational question: Under what circumstances, if any, is it morally permissible to impose such a risk at all? Before turning to the precaution question, it will be helpful to explore why an environmental mortality risk could be morally permissible to impose in the first place, as many of the same concepts involved in justifying risk imposition also come up in identifying the required level of precaution.

### *A. Justifications Involving Rights, Deontological Constraints, and Maximizing Overall Well-Being*

Under what circumstances, if any, is imposing a risk of harm on another person morally permissible? This is a deep and complicated question in normative ethics, one that is well beyond the scope of this Article to address in a comprehensive way. What can be said is that a

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89 *See, e.g.*, ADLER & POSNER, *supra* note 11, at 53 ("Our position is not utilitarianism, but 'weak welfarism' . . . [which] claims that overall welfare is *morally relevant*, not that it is morally decisive. Morality may encompass a plurality of moral factors. It certainly includes overall welfare; but it may also include such factors as moral rights, the fair distribution of welfare, and even moral considerations wholly detached from welfare, such as intrinsic environmental values.") (emphasis in original).

90 *See supra* Part II; *infra* Part III. For a discussion of contractualism, see *infra* Part III.B.

91 *See* KAGAN, *supra* note 88, at 183.

92 Waisman, *Equity and Feasibility*, *supra* note 75, at 1296–97.

93 *See* Frick, *supra* note 88, at 223 ("The aim and ambition of moral philosophy should be to inform our judgment, by making us alive to the relevant ethical considerations, not to abolish the need for judgment altogether.").

number of moral philosophers have recently recognized that individuals have not only a right not to be harmed, but a right not to be exposed to risks of harm (including risks of serious bodily harm and premature death).[94] The right against being exposed to a risk of harm is typically said to be a *prima facie* or *defeasible* right, rather than an absolute right, because it can be overridden in appropriate circumstances.[95] In certain cases, it *can* be morally permissible to impose a risk of harm (including premature death) on others; otherwise, many of the activities that make modern life possible—from driving automobiles to heating homes to using household chemicals—would be prohibited due to the low risks of harm they carry.[96] An absolute right against risk exposure therefore seems implausible. The right must be defeasible in appropriate cases.

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[94] *See* OBERDIEK, *supra* note 7, at 126–30 (recognizing an autonomy-based "right against risking" the violation of which "involve[s] the one who is (impermissibly) imposing the risk wielding power without authority over the one who is put at risk"); HANSSON, *supra* note 7, at 99 ("[W]e should recognize that each individual has a prima facie right not to have risks imposed on her by others. *The prima facie no-risk principle:* Everyone has a prima facie moral right not to be exposed to risk of negative impact, such as damage to her health or property, through the actions of others."); JUDITH JARVIS THOMSON, THE REALM OF RIGHTS 243 (1990) (advancing a "Risk Thesis" that "we have claims against others that they not impose risks of harm on us"); David McCarthy, *Rights, Explanation, and Risks*, 107 ETHICS 205, 208 (1997) (defending the "Risk Thesis" that "we have the right that other people not impose risks of harm upon us"). The right not to be exposed to a risk of harm could alternatively be conceived from the point of the view of the risk-imposing agent as a *deontological constraint* against exposing another person to a risk of harm. *See, e.g.*, KAGAN, *supra* note 88, at 83 (noting that in a subjective deontological approach, "the constraint against harming must be understood as a constraint against imposing the *risk* of harm") (emphasis in original).

[95] *See, e.g.*, HANSSON, *supra* note 7, at 100 (discussing the social need to override "prima facie right[s]" against being exposed to risk); In normative ethics, the notion of defeasible (prima facie) duties is strongly associated with the moral philosopher W.D. Ross. *See* Mason, *supra* note 88. Ross's pluralist theory of normative ethics posits a set of seven moral duty principles, each of which can be overridden in appropriate circumstances. *See* W.D. ROSS, THE RIGHT AND THE GOOD 20–22 (1930); *see also* DAVID PHILLIPS, ROSSIAN ETHICS: W.D. ROSS AND CONTEMPORARY MORAL THEORY 13 (Oxford Univ. Press 2019) (characterizing prima facie duty as Ross's "most important conceptual innovation").

[96] *See* OBERDIEK, *supra* note 7, at 127 ("We impose risks on each other constantly. While some are trivial, and others have no close bearing on the lives of other people, clearly there are still other risks that are not trivial and do bear quite directly on other people's lives. What makes delineating the content of the right against risking so difficult is that even some of these latter nontrivial, direct risk impositions are permissible. After all, just think of the risks that attend driving on highways. The hard question is how to distinguish, within this latter class of risks, permissible from impermissible risk impositions."); HANSSON, *supra* note 7, at 100 ("In practice, the prima facie no-risk principle will have to be overridden in quite a few cases. Otherwise social life would be impossible. When we heat our houses, we emit substances that contribute to the health risks of others. As car-drivers, we put the lives of other road-users at risk. Without these risk impositions we would freeze and be immobile. There are many other, similar examples."); *id.* at 97 ("It does not seem possible for a human society to avoid situations in which benefits for some persons lead to risks for others.").

One such case is where the risk is imposed as part of a social practice of reciprocal risk imposition.[97] Where the type of risk I seek to impose on you is one that you are free to impose on me and where this reciprocal right of imposition is mutually understood and accepted by both of us, it is plausibly morally permissible for either of us to impose a risk of that type on the other. A good example is the mortality risk that driving an automobile poses to pedestrians and other drivers. The moral philosopher Sven Ove Hansson observes:

> Each of us takes risks in order to obtain benefits for ourselves. This exchange of risks and benefits can be extended to exchanges between individuals that are beneficial to all of them. If others are allowed to drive a car, exposing me to certain risks, then in exchange I am allowed to drive a car and expose them to the corresponding risks. With such reciprocal exchanges of risks and benefits, we can all lead more mobile lives. Presumably, this is on balance beneficial to all of us.[98]

Two independent justificatory ideas at work here, one involving mutual consent, the other mutual benefit. First, a practice of reciprocal risk imposition involves the *implicit mutual consent* of those engaged in the practice. My right to impose a mortality risk on you by driving my car on public streets rests on our having implicitly agreed to exchange waivers of our respective rights not to be put at risk of death by another person. Implicitly, I waive my right not to be exposed to a mortality risk from your driving, making it morally permissible for you to drive your car freely in proximity to me. In exchange, you implicitly waive your right not to be exposed to a mortality risk from my driving, making it morally permissible for me to drive my car freely in your vicinity. The permissibility of the risk imposition therefore seems to rest at least partly on our implicit mutual agreement. Even if the social practice this agreement makes possible turned out not to be beneficial for either or both of us, our tacit agreement to engage in the social practice, taken on its own, could still make the risk impositions involved morally permissible. In other words, implicit mutual consent alone does justificatory work.[99]

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[97] *See* HANSSON, *supra* note 7, at 101–04 (analyzing the moral permissibility of "reciprocal risk impositions"); Fei Song, *Rights Against High-Level Risk Impositions*, 22 ETHICAL THEORY & MORAL PRAC. 763, 772–74 (2019) (defending a "refined . . . [r]eciprocity [p]rinciple" that "[i]t is permissible for someone to impose a risk of harm on others if (1) other are also allowed to impose the same risk of harm on that person (2) the reciprocal risk creates greater social benefits and (3) the reciprocal risk is not significantly high").

[98] HANSSON, *supra* note 7, at 101–02; *see also* OBERDIEK, *supra* note 7, at 132–37, 143–47 (discussing problem of highway safety from consequentialist and contractualist points of view).

[99] *See* Song, *supra* note 97, at 769–71 (defending a "[c]onsent [p]rinciple" under which "[i]t is permissible to impose a high risk of harm on someone if he or she consents to that risk based on reasonable expectations, provided that the information received about that risk is fully disclosed and no deception is involved").

But another, independent justificatory force is at play here. Risk impositions that are part of a reciprocal practice are also morally permissible because the practice presumably benefits all participants, leaving them better off than they would be in its absence. Each of us is willing to engage in the exchange Hansson describes because we have more to gain from the right to drive freely, thereby placing others at risk, than we stand to lose from giving others that right, thereby placing ourselves at risk. From an ex ante perspective, each of us is better off in a world where everyone has made this implicit exchange with everyone else than in a world in which no one has made this exchange with anyone else. The increased mobility and access to goods and services made possible by the widespread social practice of driving automobiles results in a higher quality of life for everyone. Thus, the mortality risk posed by driving is justifiable not only on the basis of implied mutual agreement, but also on the basis of mutual benefit.

While some mortality risks are part of a reciprocal practice of risk imposition and can be justified on that basis, many modern mortality risks are *not* part of a reciprocal practice in which those exposed to the risk enjoy and exercise the right to impose the same type of risk on others. Generally, mortality risks from industrial and commercial activities carried out by firms (not individuals) cannot be justified on the basis of reciprocity because the people exposed to such risks typically do not enjoy a reciprocal right to impose the identical risk on the firm placing them at risk.[100] The power plant cannot plausibly justify its imposition of a mortality risk on the subsistence fisher by pointing out that the subsistence fisher has a reciprocal right to impose a risk of fatal cardiovascular disease on the firm that owns the plant. Turning to risks generated by industrial and commercial activities, in what circumstances is it morally permissible to impose them?[101]

One kind of morally permissible risk imposition occurs when the person exposed to the risk stands to benefit in a meaningful way from the activities of the very firm whose operations place them at risk. Consider a consumption-related mortality risk such as the cancer risk from consuming arsenic present in drinking water. The risk of death from arsenic in drinking water is quite low (about 1 in 100,000) and is an ineliminable aspect of an industrial activity—provision of clean, potable water for residential and commercial use—that delivers a significant

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[100] *See* Dov Waisman, *Reasonable Precaution for the Individual*, 88 ST. JOHN'S L. REV. 653, 671–72 (2014) [hereinafter Waisman, *Reasonable Precaution for the Individual*].

[101] Risky industrial and commercial activities can be split into two groups: (1) morally permissible activities to engage in, provided a certain level of precaution is exercised, and (2) morally impermissible activities to engage in, regardless of the degree of precaution taken. The question is whether there exists a level of precaution at which a risky activity is morally permissible. If so, then it is permissible to engage in the risky activity provided that a morally permissible level of precaution is exercised. If not, then it is impermissible to engage in the activity at all. *See, e.g.*, Keating, *Pressing Precaution*, *supra* note 8, at 657–58; Driesen, *supra* note 8, at 317–18; Fried, *supra* note 8, at 260.

benefit to those exposed to the risk.[102] Given the low magnitude of the mortality risk and the importance of the benefit, it is in a water consumer's ex ante interest to be exposed to the risk. Of course, for the unlucky consumer who ends up dying from cancer caused by arsenic in their drinking water, the decision to consume the water will not ultimately have been in their interest. But from the ex ante perspective—the perspective of an individual before they have decided to consume the drinking water—a decision to consume the water is a rational one because the consumer does not, at that time, know whether they will end up being harmed when the risk materializes. All they can know at that point is the nature and magnitude of the risk (a 1 in 100,000 risk of premature death) and the nature of the associated benefit (a reliable supply of clean, potable water). Based on the information available to the consumer at that time, the consumer could *rationally* decide to consume the water and be exposed to the associated mortality risk because the benefit is significant and more-or-less certain, while the associated risk of death is very low. From the water company's perspective, providing drinking water containing a very small amount of arsenic is morally permissible because, on net and from an ex ante perspective, the company is benefitting each consumer. Based on an expected utility analysis, which discounts gains and losses to well-being by the probability that such gains and losses will occur, the water company is leaving each of its consumers better off by providing drinking water containing a small amount of arsenic.

What if a mortality risk is imposed on a person who does *not* benefit in any meaningful way from the activities of the firm whose operations give rise to the risk? Environmental mortality risks are often of this nature. Consider the environmental mortality risk discussed in Part II. Subsistence fishers are exposed to a low risk of premature death from cardiovascular disease when they consume shellfish containing lead from wastewater emitted by the local steam electric power plant. The subsistence fishers exposed to this risk likely do not benefit from the polluting firm's activities in any meaningful way. If a subsistence fisher is not employed by the firm, is not an owner or shareholder of the firm that owns the plant, and does not consume electricity generated by the firm, it is difficult to see how they would directly benefit from the firm's operations. (They might, of course, benefit indirectly, for example by consuming goods and services that could not be produced without the electricity generated by the polluting firm.) But assuming subsistence fishers do not benefit in any meaningful way from the polluting firm's activities, is it morally permissible for the firm to impose a risk of premature death on them?

Notice that, in such a case, it is not in the ex ante interest of a subsistence fisher to be exposed to the mortality risk. For the subsistence

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[102] *See generally* U.S. ENV'T PROT. AGENCY, EPA 815-R-00-026, ARSENIC IN DRINKING WATER RULE: ECONOMIC ANALYSIS, 5-24 (2000) (explaining how a "statistical" life is calculated); Waisman, *Moral Context*, *supra* note 5, at 230–33 (discussing regulation of arsenic in drinking water).

fisher, unlike the drinking water customer, exposure to the mortality risk at issue is not an ineliminable cost of receiving a significant benefit from the polluting firm. By hypothesis, the subsistence fisher receives no benefit from the activities of the steam electric power firm whose wastewater imperils their life. The firm therefore cannot justify the risk imposition by claiming that, ex ante and on net, its activities left the subsistence fisher better off.

But the firm might attempt to justify the risk imposition in other ways. One justification is based on *act consequentialism*, a theory of normative ethics holding that an act is morally permissible if it leads to better consequences than any other act that agent could have performed at the time.[103] Act consequentialism is often coupled with *welfarism*, a theory of value holding that consequences are to be ranked exclusively based on their implications for overall well-being, that is, the aggregate well-being of all individuals.[104] On this view, it would be morally permissible for the firm to place the lives of non-benefitting subsistence fishers at risk if the firm's operation delivers welfare benefits for all its beneficiaries that are greater than the welfare costs it imposes on the subsistence fishers (together with any other costs it imposes). The welfare loss associated with the mortality risk imposition and premature deaths caused by the plant's pollution is justified, on this view, by the larger welfare gains from electricity distribution to residential and commercial end users, the employment of workers, and the delivery of profits to firm shareholders. Under welfarist act consequentialism, operating the polluting plant is morally permissible because it delivers a net increase to overall well-being, compared to not operating the plant.

A normative pluralist might reasonably balk at this justification, however. To be sure, normative pluralism accords some weight to the justification offered by welfarist act consequentialism. But a normative pluralist also considers *deontological constraints*, which are agent-relative constraints on performing certain types of actions, even if they

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[103] Consequentialism is the view that the rightness or wrongness of a particular act depends entirely on the goodness or badness of the act's outcomes. *See, e.g.*, Walter Sinnott-Armstrong, *Consequentialism*, STAN. ENCYCLOPEDIA OF PHIL. (Oct. 4, 2023), https://plato.stanford.edu/archives/win2023/entries/consequentialism/ [https://perma.cc/A7PB-V7AT] (defining consequentialism). A common form of consequentialism is *act consequentialism,* which holds that an act is morally permissible if and only if, among all possible alternative acts the agent might have performed at the time, it would be expected to result in the best outcome overall. *See, e.g.*, Brad Hooker, *Rule Consequentialism*, STAN. ENCYCLOPEDIA OF PHIL. (Jan. 15, 2023), https://plato.stanford.edu/archives/spr2023/entries/consequentialism-rule/ [https://perma.cc/ELT8-4RU6] (defining the "[a]ct-consequentialist criterion of wrongness" as "[a]n act is wrong if and only if it results in less good than would have resulted from some available alternative act").

[104] *See, e.g.*, Roger Crisp, *Well-Being*, STAN. ENCYCLOPEDIA OF PHIL. (Sep. 15, 2021), https://plato.stanford.edu/archives/win2021/entries/well-being/ [https://perma.cc/VDL6-RPRF] ("According to . . . welfarism, well-being is the only value" and "the justificatory force of any moral reason rests on well-being.").

increase or maximize overall well-being.[105] Some of the more familiar deontological constraints are the constraints against doing harm, intending harm, and using others as a means to accomplishing some end.[106] As mentioned above, a constraint (or right) against imposing a risk of harm has also been recognized and discussed by a number of prominent moral philosophers.[107] A risk of premature death is plausibly the most severe type of risk that can be imposed on a person. When a low risk of premature death is imposed on someone as an ineliminable aspect of delivering a benefit to that same person, the constraint against risk imposition can plausibly be surmounted. Recall the example of arsenic in drinking water discussed above. But when a mortality risk is imposed on one person in order to provide a benefit to some other person, the constraint against risking cannot so easily be overridden.[108] When subsistence fishers' lives are placed at risk so that consumption, employment, financial, or other types of benefits can be delivered to other groups of people, there is a clear sense in which the fishers' interests are being *sacrificed* to promote the interests of others. The subsistence fishers, though not exactly being used as a means by which to provide benefits to others, are not being treated as ends in themselves, as people whose lives are worthy of respect for their own sake.[109] Imposing a mortality risk on Group A for the sake of providing a benefit to Groups B, C, and D is morally problematic in a way that imposing a mortality risk on Group A in order to provide a compensating benefit to Group A is not.

A normative pluralist might still find the risk imposition justifiable if the gain to overall well-being were great enough to override the deontological constraint against placing the lives of others at risk.[110] For

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[105] *See, e.g.*, Larry Alexander & Michael Moore, *Deontological Ethics*, STAN. ENCYCLOPEDIA OF PHIL. (Oct. 30, 2020), https://plato.stanford.edu/archives/win2020/entries/ethics-deontological/ [https://perma.cc/LRA3-F363] ("The most familiar forms of deontology, and also the forms presenting the greatest contrast to consequentialism, hold that some choices cannot be justified by their effects—that no matter how morally good the consequences, some choices are morally forbidden . . . . For such deontologists, what makes a choice right is its conformity with a moral norm.").

[106] *See, e.g.*, *id.*; KAGAN, *supra* note 88, at 94–105.

[107] *See* sources cited *supra* at note 94 and accompanying text.

[108] *See, e.g.*, HANSSON, *supra* note 7, at 98 ("Everyday moral reasoning does not in general allow gains for one person to cancel out losses for another. I am not allowed to inflict even a minor loss on you against your wish in order to achieve a larger gain for myself or for some third person."); Lenman, *supra* note 7, at 100 (noting that, per contractualism, "[h]arm to you cannot be straightforwardly compensated by benefits to me").

[109] Kant famously held that morality requires that we act to treat humanity, in ourselves or in others, always as an end in itself and never as a mere means to accomplishing some other end. IMMANUEL KANT, GROUNDWORK FOR THE METAPHYSICS OF MORALS (Laura Denis ed., 2005) 87–88; *see generally* Richard W. Wright, *The Standards of Care in Negligence Law*, *in* PHILOSOPHICAL FOUNDATIONS OF TORT LAW 261 (David G. Owen ed., 1995) (using the label "[d]efendants' [treat] [o]thers as [m]eans" to describe cases in which "the defendant (D) put the plaintiff (P) at risk to benefit the defendant (D) or some third party, and the plaintiff did not seek to benefit directly from the defendant's risk-creating activity").

[110] Earlier we saw that the deontological constraint against risk imposition, to be plausible, must be capable of being overridden in appropriate cases. *See supra* notes 96–99

example, if the activity giving rise to the mortality risk will directly prevent a large number of premature deaths that would otherwise occur, that may render the risk imposition justifiable.[111] It may be justifiable to impose a low mortality risk on a large group of people if doing so is an ineliminable aspect of an activity that will save the lives of thousands (or even hundreds) of a different group of people. Certain activities like manufacturing pharmaceuticals or producing vaccines might be justifiable in this way. It is at least arguably morally permissible for a firm to impose a 1 in 100,000 mortality risk on 100,000 people (resulting in one premature death) in order to produce a vaccine that will save 1,000 lives that would otherwise have been lost to a deadly disease. But many industrial and commercial activities do not save lives in so direct a manner as pharmaceutical manufacturing and vaccine production do. In the case of an activity like generating electric power (or refining oil, manufacturing cement, manufacturing automobiles, or any other activity that does not directly prevent premature deaths), if one is not persuaded by the consequentialist justification for imposing the associated mortality risk on a group of people who do not benefit from the polluting firm's activities, how might one justify the risk imposition?

### *B. Justifications Involving (Ex Ante) Contractualism*

One justification moral philosophers have offered rests on *contractualism*, a relatively new theory of normative ethics formulated by

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and accompanying text. Normative pluralists might regard deontological constraints generally as capable of being overridden if the good consequences resulting from violating the constraint (e.g., the gain to overall well-being) are great enough. This is known as *threshold deontology*, since it holds that deontological constraints are not absolute, but rather come with a threshold that, once exceeded, makes it morally permissible to violate the constraint. *See, e.g.*, Alexander & Moore, *supra* note 105 ("A threshold deontologist holds that deontological norms govern up to a point despite adverse consequences; but when the consequences become so dire that they cross the stipulated threshold, consequentialism takes over. *A* may not torture *B* to save the lives of two others, but he may do so to save a thousand lives if the 'threshold' is higher than two lives but lower than a thousand.") (citation omitted); KAGAN, *supra* note 88, at 78–84. For example, threshold deontology would hold that although there is a deontological constraint against breaking promises, the constraint has a threshold allowing it to be permissibly overridden if enough good can be brought about by breaking a promise. Suppose I've made a promise to meet a friend for dinner. I can permissibly break that promise if that is the only way for me to prevent a death that would otherwise occur. The good of preventing the death of a human being is large enough to overcome the threshold on the constraint against breaking a promise to meet a friend for dinner. But I likely cannot permissibly break the promise in order to help a work colleague meet a deadline for a project they are working on. The good of preventing someone from submitting a work project after the deadline is likely not large enough to overcome the constraint's threshold.

111 *See* Song, *supra* note 97, at 771 ("It is also plausible to think that we can have very strong prohibitions against impositions of a high risk of harm, but, at the same time, allow the potential for these prohibitions to be overridden in some extreme circumstances, such as preventing disaster.").

T.M. Scanlon in 1982.[112] Contractualism is a theory of *interpersonal* morality or, to use Scanlon's famous phrase, "what we owe to each other."[113] According to contractualism, "an act is wrong if its performance under the circumstances would be disallowed by any set of principles for the general regulation of behavior that no one could reasonably reject as a basis for informed, unforced general agreement."[114]

The contractualist criterion of moral wrongness involves three main ideas: (i) interpersonal morality involves the requirement of justifiability to *each* affected person considered as an individual, rather than the requirement of justifiability to *all* affected persons considered in the aggregate;[115] (ii) the moral status of a particular act (its rightness or wrongness) is a function of the moral validity of the *general principle* licensing the act;[116] and (iii) tying together the first two ideas, a principle is justifiable to each person if and only if no person could *reasonably reject* it as a principle for the general regulation of behavior.[117] Thus, under contractualism, an act is morally wrong if and only if no one could reasonably reject a general principle disallowing the act.

When, under contractualism, can a principle be reasonably rejected? The idea behind reasonable rejectability is the *minimax criterion*.[118] Among a set of candidate principles, the nonrejectable principle P is the one of which the following is true: the strongest complaint any person could make against P, were P generally accepted, is weaker than the strongest complaint that could be made against every other alternative principle.[119] As Scanlon puts it, "someone can reasonably reject a principle if there is some alternative to which no other person has a complaint that is as strong."[120] The principle no one could reasonably

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112 *See* T.M. SCANLON, WHAT WE OWE TO EACH OTHER 189 (1998) [hereinafter SCANLON, WHAT WE OWE TO EACH OTHER]; T.M. Scanlon, *Contractualism and Utilitarianism*, *in* UTILITARIANISM AND BEYOND 103, 103 (Amartya Sen & Bernard Williams eds., 1982) [hereinafter Scanlon, *Contractualism*].

113 Thus, contractualism does not directly address questions of political morality, the moral strictures applicable to the actions and policies of coercive institutions, nor does it address our moral obligations to animals or the natural environment. *See* SCANLON, WHAT WE OWE TO EACH OTHER, *supra* note 112, at 179.

114 *Id.* at 153.

115 *Id.* at 390 n.8 ("What is basic to contractualism as I understand it is the idea of justifiability to each person (on grounds that he or she could not reasonably reject).").

116 *Id.* at 197 ("To justify an action to others is to offer reasons supporting it and to claim that they are sufficient to defeat any objections that others may have. To do this, however, is also to defend a principle, namely one claiming that such reasons are sufficient grounds for so acting under the prevailing conditions.").

117 *Id.* at 197, 390 n.8.

118 I follow Sophia Reibetanz Moreau in using the minimax criterion to explain the notion of reasonable rejectability. *See* Sophia Reibetanz, *Contractualism and Aggregation*, 108 ETHICS 296, 300 (1998) (describing a "minimax complaint model" of reasonable rejectability) (citation omitted).

119 *See id.*; Scanlon, *Contractualism*, *supra* note 112, at 111–12.

120 SCANLON, WHAT WE OWE TO EACH OTHER, *supra* note 112, at 229; *see also* Scanlon, *Contractualism*, *supra* note 112, at 111 ("[I]t would be unreasonable . . . to reject a principle

reject is the principle that, among a set of candidate principles, *minimizes* the strength of the complaint that could be lodged by the *maximally* burdened person. If I am the person who would be most burdened by general acceptance of a particular principle, I still cannot *reasonably* reject that principle if every alternative principle would, if generally accepted, impose a greater burden on someone else.[121]

A contractualist evaluation of an environmental mortality risk imposition would involve shifting focus from the particular firm whose operations create the mortality risk to the general industrial or commercial activity in which the firm is engaged. It is possible for an individual not to benefit from the activities of the particular firm whose operations impose a low mortality risk on them, and yet nevertheless benefit, ex ante and on net,[122] from the general industrial or commercial activity in which the firm is engaged, particularly if the activity is one that is foundational to modern life (e.g., generating electricity, refining oil, manufacturing pharmaceuticals and vaccines, manufacturing cement and other construction materials, manufacturing automobiles, etc.). In such a case, assuming the mortality risk cannot be entirely eliminated without discontinuing the activity altogether, the risk imposition can be justified as an ineliminable aspect of an activity that, taking the mortality

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because it imposed a burden on you when every alternative principle would impose much greater burdens on others.").

[121] In cases involving the imposition of a risk of harm, as opposed to the imposition of harm itself, contractualism requires a further specification. Are the possible policies or courses of action to be evaluated based on the *risk of harm* they pose to each person they *might* impact (so-called "ex ante contractualism") or based on the *actual harm* they cause to the person or persons they *do* impact (so-called "ex post contractualism"). For reasons I have described elsewhere, I find ex ante contractualism to be the more plausible and defensible form of contractualism in cases involving imposition of a risk of harm. *See* Waisman, *Equity and Feasibility*, *supra* note 75, at 1291–95. A number of commentators have reached a similar conclusion. *See, e.g.*, Frick, *supra* note 88, at 180; Aaron James, *Contractualism's (Not So) Slippery Slope*, 18 LEGAL THEORY 263, 274, 292 (2012); Kumar, *supra* note 7, at 48.

[122] An individual benefits from a risky activity "ex ante and on net" if the activity—considering all the costs (i.e., welfare losses) and benefits (i.e., welfare gains) it delivers to the individual and evaluated from a forward-looking standpoint that discounts all those costs and benefits by their respective chances of occurring—has the overall effect of increasing the individual's expected well-being. *See* HANSSON, *supra* note 7, at 104 ("Exposure of a person to a risk is acceptable if this exposure is part of a social practice of risk-taking that works to her own advantage and which she de facto accepts by making use of its advantages."); *see also* Keating, *Pressing Precaution*, *supra* note 8, at 735 ("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."). For example, if a subsistence fisher is certain to benefit from the activity of electricity generation, for which they would be willing to pay $5,000 per year, and the activity imposes an annual mortality risk of 1 in 10,000 that the subsistence fisher would be willing to pay $1,000 to avoid, the activity benefits the subsistence fisher ex ante and on net because it has a positive overall impact on their expected well-being ($5,000 - $1,000 = $4,000).

risk imposition into account, ultimately works to the risk-bearer's ex ante advantage on net.[123]

Consider again the subsistence fisher who is exposed to a low mortality risk from the operations of a steam electric power plant but does not benefit in any way from the operations of the firm that owns the plant. To the subsistence fisher, the risk imposition could be justified based on the critically important benefits delivered by the general activity of steam-powered generation of electricity. It is difficult to think of an industrial activity that is more foundational to modern life than the generation of electric power. Assuming the subsistence fisher is a participant in modern society,[124] they benefit significantly from the availability of electric power generated by steam-powered plants, even if they do not benefit from the activities of the particular plant whose wastewater puts them at risk. The imposition of a mortality risk on the subsistence fisher would then be justified if: (1) there is no way to engage in the general activity of steam-powered generation of electricity without imposing low risks of premature death on certain individuals, including individuals who do not benefit from the operations of the particular firm or plant that places them at risk;[125] and (2) taking into account the low

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[123] *See* HANSSON, *supra* note 7, at 102–03 ("A factory in your neighborhood manufactures product *A*, which you do not use. The factory emits a chemical substance that gives rise to a very small risk to your health. At the same time, another factory, far away from your home, emits other chemicals in the production of product B that you use. One of the neighbours of this second factory does not use product *B*, but instead uses product *A*. In this way, and sometimes in much more complex chains, we may be said to exchange risks and benefits with each other. There is an obvious moral limit to such arrangements: Their total effects should be to the benefit of all concerned. No single person should be exposed to risks to an extent or in ways that cannot be justified by benefits to herself, either directly or indirectly through risk exchanges with others. We cannot require that every single risk-exposure be to the risk-exposed person's benefit, but the totality of risk-exposures should be so arranged that everyone gains, and no one is exploited.").

[124] I set to the side the case of persons, such as the Amish, who choose not to participate in modern society in any meaningful way and so do not experience the life-improving benefits of major industrial activities such as electric power generation. *See* OBERDIEK, *supra* note 7, at 147–50 (discussing this sort of case); HANSSON, *supra* note 7, at 103–04 (restricting the principle of permissible risk imposition to "those persons who do not seclude themselves from the social practice we are considering"); Kumar, *supra* note 7, at 34–35 (discussing the case of a mortality risk posed by commercial aviation to an Amish person).

[125] *See* OBERDIEK, *supra* note 7, at 149 ("The only way to keep anyone from dying from a risky activity is to ban that activity outright, but the principle that such a ban would instantiate would rule out all risky activity, and it is *that* ban that must be assessed from everyone's perspective in accordance with intrapersonal aggregation. Faced with the life of confinement that would follow from banning highways, and by implication a wide range of other relevantly similar risky activities, it is plausible to suppose that such a life is one that nobody could accept.") (emphasis in original); Keating, *Pressing Precaution*, *supra* note 8, at 725 ("What is the case for treating the cessation of a major, productive economic activity as comparable to a significant risk of devastating injury? . . . [F]easibility analysis appeals implicitly to the idea that, in terms of value, the major, productive activities to which it applies are indistinguishable. The case for shutting down one major productive activity is therefore a case for shutting down all similar activities. That price is too high to pay for the elimination of significant risk.").

magnitude of the mortality risk imposed and all of the other ways in which the general activity of steam-powered generation of electricity affects the subsistence fisher, they benefit, ex ante and on net, from that activity.[126] If these two premises hold, it follows that the subsistence fisher is better off in a world in which the risk is imposed than in one in which the risk is not imposed. Avoiding the imposition of risk would require halting steam-powered electricity generation altogether—a step that would leave the subsistence fisher worse off overall than if the activity, with its unavoidable mortality risks, were allowed to go forward.[127]

To frame this analysis in contractualist terms, the focus is on the parties who are respectively most burdened by (who respectively have the strongest complaints against) the two candidate principles: a principle permitting steam-powered electricity generation and a principle prohibiting that activity. Assuming that (1) in virtue of the mortality risk they face from power plant wastewater, the subsistence fisher is the individual most burdened by a principle permitting steam-powered generation of electricity, and (2) the subsistence fisher would face an even *greater* burden from a principle prohibiting that industrial activity, it follows that the prohibitory principle could reasonably be rejected but the permissive principle could not. Because the subsistence fisher has the strongest complaint against a principle permitting steam-powered electricity generation and a stronger complaint against a principle prohibiting that activity, it follows that the strongest complaint one could lodge against the prohibitory principle is necessarily stronger than the strongest complaint one could lodge against the permissive principle. Of course, it is possible that some other person has an even stronger complaint against the prohibitory principle than the subsistence fisher does, but this would not change the outcome of the contractualist analysis. Either way, the strongest complaint against the prohibitory principle would be stronger than the strongest complaint against the permissive principle.[128] For that reason, no one could reasonably reject a

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[126] *See* OBERDIEK, *supra* note 7, at 146 ("In cases where intuitively permissible deadly risk is imposed, say as on highways, even one who ends up being killed must recognize that the risk to which one was exposed was counterbalanced by offsetting benefits—even for oneself—given what a reasonable inspection of the magnitude of the risk would reveal.").

[127] *See* sources cited, *supra* note 122. To account for the requirements of justice and equal influence, Hansson goes on to reformulate his principle as follows:

> Exposure of a person to a risk is acceptable if (i) this exposure is part of a persistently justice-seeking social practice of risk-taking that works to her advantage and which she de facto accepts by making use of its advantages, and (ii) she has as much influence over her risk-exposure as every similarly risk-exposed person can have without loss of the social benefits that justify the risk-exposure.

HANSSON, *supra* note 7, at 108.

[128] *See* Keating, *Pressing Precaution*, *supra* note 8, at 735 n.187 ("It is important to recall that matters are more complex when terminating an activity would be to the advantage of those most endangered by it in the sense we have defined, but would impose a comparable burden on others who benefit from the activity. Then we must decide if the benefit to those

principle permitting firms to operate steam electric power plants and impose the associated ineliminable mortality risks.

But what if the person exposed to the mortality risk does not benefit from the activities of the firm whose operations place them at risk or from the general activity in which the firm is engaged? This might be the case where the risky activity is one that is *not* foundational to modern life, for example, the manufacture of perfume, cosmetics, luxury goods, or other products of a type that only a discrete subset of people regularly consume. To take a concrete example, suppose that a meat processing plant that emits wastewater poses a mortality risk to local subsistence fishers—a risk that could be eliminated only by discontinuing the processing plant's operations.[129] Assuming the subsistence fishers do not benefit in any meaningful way from either the specific activities of the polluting plant or from the general activity of meat processing, is it justifiable for the processing plant to impose a mortality risk on them?

One way the risk imposition *might* be justified is by shifting focus from both the risk-imposing firm's operations and the industrial or commercial activity in which the firm is engaged to the general principles of risk imposition governing society. A principle banning any industrial or commercial activity that imposes a mortality risk on individuals who do not benefit from the activity might well have a disruptive effect on the economy.[130] Whether it did would seem to depend on what proportion of industrial and commercial activities impose ineliminable risks of premature death on persons who do not meaningfully benefit from the activity. If a majority (or even a substantial minority) of such activities do so, then a principle banning all such activities could mean shutting down multiple commercial and industrial sectors, thereby destabilizing the economy. In that case, and assuming the imperiled subsistence fisher participates in society and the economy and enjoys the many benefits of doing so, a principle banning any risky industrial or commercial activity that imposes mortality risks on individuals who do not benefit from that

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others is greater than the burden of significant risk to the most endangered. In the kind of case we are considering, this would happen when the burden to shareholders and consumers of shutting down a major productive activity is greater than the burden to workers of bearing a significant risk of injury.").

129 *See* U.S. ENV'T PROT. AGENCY, EPA-821-R-23-013, BENEFIT COST ANALYSIS FOR REVISIONS TO THE EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS FOR THE MEAT AND POULTRY PRODUCTS POINT SOURCE CATEGORY ES-4 (2023).

130 *Cf.* OBERDIEK, *supra* note 7, at 149 ("[B]anning highways would not . . . merely ban highways . . . . [It] would . . . reject[] all risky instrumentalities and activities having a roughly similar profile . . . . The only way to keep anyone from dying from a risky activity is to ban that activity outright, but the principle that such a ban would instantiate would rule out all risky activity, and it is *that* ban that must be assessed from everyone's perspective[.] . . . [I]t is plausible to suppose that such a life is one that nobody could accept."). *But cf.* HANSSON, *supra* note 7, at 103 ("In practice . . . it is impossible to keep track of the combined distributional effects of risk exchanges across different social sectors and make sure that compensation takes place whenever necessary. Therefore, the risk exchanges . . . should primarily concern risks and benefits within the same social sector, such as the sectors of transportation, industrial production, healthcare, etc.").

activity would almost certainly place a greater burden on the subsistence fisher than would a principle permitting such activities. The subsistence fisher would plausibly be more disadvantaged by the economic and social disruption that results from discontinuing all risky activities that imperil non-beneficiaries than by the imposition of low mortality risks from a subset of such activities. Thus, by abstracting out to the general principles of risk imposition governing society as a whole, the meat processing plant might be able to justify its imposition of a mortality risk on the subsistence fisher. Although it may be the case that neither the plant's operations nor the general activity of meat processing benefits the subsistence fisher, a general principle licensing risk impositions of the type the subsistence fisher faces from the meat processing plant *could* benefit the subsistence fisher and work to their advantage ex ante and on net.[131] However, it is crucial to bear in mind that this conclusion rests on an empirical premise that I cannot verify or explore here: that a significant proportion of industrial and commercial activities impose mortality risks on non-beneficiaries. If that turned out *not* to be the case, it is difficult to see how the meat processing plant could justify imposing a mortality risk on the local subsistence fishers if the fishers do not benefit from the specific plant's operations or from the activity of meat processing. Overall, the contractualist case for the permissibility of risky activities that benefit those placed at risk of premature death seems significantly stronger than the contractualist case for the permissibility of risky activities that do not benefit those they imperil.

In sum, from the perspective of normative pluralism, imposing an environmental mortality risk on someone who does not benefit from the activities of the firm whose operations generate the risk might be justified in a variety of ways. Such a risk imposition might be justified on the basis of welfarist act consequentialism, particularly if the risk is imposed incident to an industrial or commercial activity that directly prevents the loss of life (like vaccine production). But for a normative pluralist, any such justification will have to overcome the deontological constraint against imposing (or the right not to be exposed to) a risk of harm. This will be difficult to do since, by hypothesis, the interests of the individuals exposed to the risk are being sacrificed in order to further the interests of those who benefit from the risky activity. The most persuasive justification for imposing environmental mortality risks is contractualist in nature. It involves showing that, although the persons exposed to the risk may not benefit from the operations of the risk-imposing firm, they

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[131] Even if a principle permitting risky activities that imperil nonbeneficiaries did *not* work to their ex ante advantage, the principle would survive contractualist scrutiny if the burden experienced by the person most burdened by the discontinuation of such activities were weightier than the burden experienced by the person most burdened by the allowance of such activities (likely a person exposed to a mortality risk from an activity from which they do not benefit). In that case, a principle permitting such activities would not be reasonably rejectable and a principle banning such activities would be. *See* Keating, *Pressing Precaution*, *supra* note 8, at 735 n.187.

benefit, ex ante and on net, from the general activity in which the firm is engaged or from the general principles of risk imposition governing society as a whole. If the general industrial or commercial activity significantly benefits the person exposed to the risk, and the risk is an ineliminable part of that activity, the risk imposition can work to the advantage of the imperiled person even if they do not benefit from the activities of the particular firm whose operations generate the risk. And even in cases where the imperiled person benefits neither from the particular firm's operations nor from the specific industrial or commercial activity in which the firm is engaged, the risk imposition might still work to their advantage if they actively participate in modern society and the economy, provided that a ban on risky activities that imperil non-beneficiaries would have a significantly disruptive effect on the economy as a whole.

## IV. THE NORM OF MAXIMIZING OVERALL WELL-BEING DOES NOT SUPPORT VSL-BASED CBA132

In this Part, I begin to address this Article's central question: when it is morally permissible for a firm to engage in an industrial or commercial activity that imposes an environmental mortality risk on persons who do not benefit from the firm's operations, what level of risk-reducing precaution is the firm required to exercise? Is it morally sufficient for the firm to make all and only those investments in precaution that are dictated by VSL-based CBA? I will argue that, when it comes to environmental mortality risks, using VSL-based CBA to guide risk regulation is normatively unsound.

For the remainder of this Article, my argument assumes that it is morally permissible for a firm to engage in an activity that poses an environmental mortality risk to persons who do not benefit from the firm's operations. To do this, I assume that there exists a level of risk-reducing precaution at which it is morally permissible for the firm to engage in the risky activity. The question I will address is whether the level of precaution dictated by VSL-based CBA is morally sufficient. I will use as an example the environmental risk imposition described in Part II: the risk of fatal cardiovascular disease imposed on subsistence fishers by a steam electric power plant that releases wastewater containing lead and other pollutants. I assume that this risk imposition is best justified on the sort of contractualist grounds described in Part III.

As noted in Part I, the normative basis for CBA is usually taken to be maximizing overall well-being.[133] CBA treats money as a proxy for

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[132] The discussion in this Part is drawn on the consumption risk analysis in Part II.B of an earlier article of mine, *Moral Context and Risks of Death*. *See* Waisman, *Moral Context*, at 233–43 (arguing that the norm of maximizing overall well-being does not justify using VSL-based CBA to regulate consumption-related mortality risks such as the cancer risk from arsenic in drinking water).

[133] *See supra* Part I.

well-being, taking monetized benefits as additions and monetized costs as subtractions.[134] Thus, a regulation whose costs exceed its benefits is unjustifiable because it takes more well-being away from the world than it adds to the world, decreasing net well-being. When it comes to mortality risk regulation, many commentators have argued or suggested that VSL-based CBA can be justified on the basis of welfare maximization.[135]

However, VSL-based CBA fails to accurately capture a regulation's effect on overall well-being because it undervalues the welfare benefit of eliminating or reducing a risk of premature death. While the VSL may capture the welfare setback with exposure to a low risk of premature death, it does not persuasively capture the welfare loss associated with premature death itself.

Suppose the mortality risk from lead-polluted wastewater discharged by steam electric power plants into rivers, lakes, and streams is 1 in 50,000 and that this risk falls on 100,000 subsistence fishers. Suppose this risk, while impossible to eliminate entirely without discontinuing the activity altogether, can be reduced to 1 in 100,000 if the government enacts a particular regulation; the regulation's expected benefit is therefore the prevention of one premature death. Suppose the regulation would cost the polluting firms a total of $12 million to comply with. Suppose further that this cost would be entirely passed on to and equally distributed among 100,000 of the polluting firms' residential electricity customers in the form of a price increase of $120. Suppose finally that the government decides *not* to enact the regulation on the grounds that it is not cost-justified. Assuming a VSL of $10 million, the regulation's total cost exceeds the monetized value of its total benefit (the prevention of one premature death) by $2 million. The question I would like to explore is whether this regulatory decision can be defended on the basis of the norm of welfare maximization. Although proponents of VSL-based CBA would argue that it can be so defended, a close analysis suggests otherwise.

To focus the analysis on the normative aspects of VSL-based CBA, I will make several unrealistic assumptions. I will assume that each individual affected by the regulation has the same degree of aversion to mortality risks, pre-existing wealth, and well-being. I will also assume that each affected individual, acting with complete freedom and perfect information, has shown a willingness to pay the same specified amount of money to avoid exposure to a mortality risk. Specifically, I will assume that for the group of 200,000 individuals (100,000 subsistence fishers and

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[134] *See* Sinden, *supra* note 12, at 918; ADLER & POSNER, *supra* note 11, at 13, 25, 26; Posner & Sunstein, *Moral Commitments*, *supra* note 19, at 1822*;* ADLER, WELL-BEING AND FAIR DISTRIBUTION, *supra* note 11, at 91.

[135] *See, e.g.*, ADLER & POSNER, *supra* note 11, at 178–80 (analyzing the ability of CBA to capture welfare effects); SUNSTEIN, *supra* note 13, at 92, 113–15, 128–30; *cf.* Matthew D. Adler & Eric A. Posner, *Implementing Cost-Benefit Analysis When Preferences Are Distorted*, 29 J. LEGAL STUDS. 1105, 1110–11 (2000) (discussing the criterion of overall well-being as providing the normative foundations of CBA).

100,000 electricity customers) each and every individual in the group has decided that they would be willing to pay exactly $100 (no more and no less) to eliminate exposure to a 1 in 100,000 risk of premature death. In other words, my assumption is that the 200,000 individuals are identical to one another in all relevant respects except their relationship to the mortality risk at issue: half of the individuals are exposed to the risk but do not bear the costs of reducing it, while the other half bear the costs of reducing the risk but are not exposed to it.

With these assumptions, two conclusions seem to follow: one regarding *individual preferences* and the other regarding *individual well-being*. First, it would be rational for each of the 200,000 affected persons to *prefer* being exposed to a 1 in 100,000 mortality risk to having to pay a $120 cost. If a benefit is worth $X to a person, it is not rational for the person to pay a cost of more than $X for that benefit. In such a case, it is rational to prefer foregoing the benefit and avoiding the cost to paying the cost and receiving the benefit. From this point about individual preferences, one might make an inference about each affected person's individual level of well-being: imposing a cost of $120 rather than an additional mortality risk increment of 1 in 100,000 would leave each person *worse off*.[136] If it is stipulated to be rational for an individual to prefer one state of affairs to another, there is a straightforward sense in which the individual is better off in the preferred situation and worse off in the other situation. If each affected person would rationally prefer being exposed to a 1 in 100,000 mortality risk to having to pay a $120 cost, this suggests that each person would be worse off having to pay the cost than being exposed to the risk.

One might then posit that this conclusion about each individual's well-being leads directly to a conclusion about aggregate well-being for the full group (the 100,000 customers and the 100,000 subsistence fishers). If paying $120 would reduce each person's well-being by more than bearing a 1-in-100,000 mortality risk would, it seems to follow that imposing a $120 cost on each of the 100,000 customers would create a larger total welfare loss than imposing a 1-in-100,000 mortality risk on each of the 100,000 subsistence fishers. In other words, the overall well-being across all 200,000 affected individuals would be higher if regulators left the existing 1-in-50,000 mortality risk unchanged than if they enacted the contemplated regulation. The gain to overall well-being

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136 *See* SUNSTEIN, *supra* note 13, at 92 ("Suppose that people are willing to pay $60, but not more, to eliminate a risk of 1/100,000. If so, then it might be assumed that their welfare is increased by asking them to pay that amount—and that their welfare is decreased by asking them to pay more."). Some have questioned whether a person's willingness to pay for a benefit correlates with the impact the benefit would have on their individual well-being. *See, e.g.*, John Bronsteen, Christopher Buccafusco & Jonathan S. Masur, *Well-Being Analysis vs. Cost-Benefit Analysis*, 62 DUKE L.J. 1603, 1645–64 (2013) (analyzing the inherent problems with accurately assessing people's knowledge of CBA factors and their rationality in the face of such information). Here, I set that concern to the side and assume for the sake of my normative analysis that a meaningful correlation exists between willingness-to-pay and individual welfare.

resulting from the regulation's risk-reduction benefit is smaller than the loss to overall well-being resulting from the regulation's $12 million cost. The welfare-maximizing course of action would therefore seem to be not enacting the regulation. One might then infer that enacting the regulation—and thereby imposing the regulatory cost rather than the risk—would be normatively indefensible.

This argument, however, does not consider the welfare loss associated with *premature death itself*. When a 1 in 100,000 risk of death is imposed on 100,000 people, two welfare-related setbacks would be expected to occur, one ex ante and one ex post.[137] Ex ante, each of the 100,000 people on whom the risk falls experiences a setback to a welfare-related interest[138]—the interest in avoiding exposure to a risk of premature death—just by virtue of being subject to the risk and regardless of whether they are even aware of it. Separate from this, one person is expected to lose their life if the risk is imposed. The welfare loss associated with this *ex post* effect of the risk imposition—one expected premature death—does not seem to be considered in the argument above. The argument plausibly uses willingness-to-pay to capture the welfare effect of the risk's *imposition* on 100,000 people, but apparently ignores the welfare effect of the risk's expected *materialization* in the death of a single person.[139] When the welfare loss associated with the one expected

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[137] *See* SUNSTEIN, *supra* note 13, at 92.

[138] *See id.*; Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. PA. L. REV. 1553, 1565 (2002) [hereinafter Ackerman & Heinzerling, *Pricing the Priceless*] ("In acknowledging the monetary value of reducing risk, economic analysts have contributed to our growing awareness that life-threatening risk itself—and not just the end result of such risk, death—is an injury."); Richard A. Posner, *Cost-Benefit Analysis: Definition, Justification, and Comment on Conference Papers*, *in* COST-BENEFIT ANALYSIS: LEGAL, ECONOMIC, AND PHILOSOPHICAL PERSPECTIVES 317, 324–25 (Matthew D. Adler & Eric A. Posner eds., 1st ed. 2001). It may be more appropriate to think of the imposition of a small risk of death as involving a *setback to a welfare-related interest* of the risk-bearer rather than an actual *welfare loss* to the risk-bearer. However, premature death itself unquestionably involves a true welfare loss. *See* ADLER & POSNER, *supra* note 11, at 179–80 ("[T]he overall-welfare loss in premature death is not infinite, but the *finite* difference in utility between a longer and shorter life history.") (emphasis in original). In what follows, I refer to the impact of the mere imposition of a mortality risk as a "setback to a welfare-related interest" or "welfare setback" and will reserve the term "welfare loss" to refer to the impact of the materialization of a mortality risk in premature death. I take risk imposition and risk materialization to impact overall well-being, even though the former may not involve an actual welfare loss. There is a sense in which merely being exposed to a risk of premature death makes a person worse off than they would be if they were not so exposed.

[139] I am not the first to lodge this critique of the welfare maximization justification for VSL-based CBA. Matthew Adler has observed that the critique originated with a 1978 article by the philosopher John Broome. *See generally* John Broome, *Trying to Value a Life*, 9 J. PUB. ECONS. 91, 91–92 (1978) (arguing that monetizing human life in CBA is conceptually unsound). Adler describes Broome's critique as follows:

> Imagine the government must choose between two outcomes: the status quo, and an outcome in which (1) exactly one person will die; (2) one million persons are at risk of suffering this death; and (3) other benefits, valued at $B, are realized . . . . Each person Pi, out of the million persons at risk of dying, would be willing to accept some

premature death is added to the welfare setback associated with the imposition of a 1 in 100,000 risk of death on 100,000 people, it is not clear that imposing the risk would leave *everyone better off* than imposing the $12 million cost would.

When a 1 in 100,000 mortality risk is imposed on 100,000 people, 100,000 people experience a setback to the welfare-related and bodily integrity-related interest in avoiding exposure to a risk of premature death.[140] It may also be the case that one unlucky person experiences the welfare loss associated with premature death. What the VSL really captures is the collective willingness-to-pay of 100,000 people to each avoid exposure to the 1 in 100,000 mortality risk. The VSL represents the amount 100,000 people would pay to avoid the setback associated with them each being exposed to a 1 in 100,000 mortality risk, a setback that each of the 100,000 suffers regardless of whether the risk materializes in the death of any of them. That is the most straightforward and correct way of interpreting the information from the wage studies and other revealed preference studies from which the VSL is derived. This leaves the welfare loss associated with premature death itself unaccounted for. The norm of maximizing overall well-being therefore fails to persuasively justify the use of the VSL in standard CBA.

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amount Vi as compensation for his one-in-one-million risk. These (small) monetary amounts can be aggregated to produce an overall cost figure $C = ∑Vi . . . . *On an ex post view there seem to be two kinds of harm here, not one.* First, each of the million suffers a risk of death; and that harm, cumulatively, is captured by ∑Vi. Second, and quite separately, the person who will die is very seriously harmed: his life is shortened, and (in the typical case) the balance of welfare goods realized over the course of his life will be much lower. *But this second harm is, apparently, ignored when the total cost of the policy is set equal to ∑Vi.* If ∑Vi is, in some way, a measure of this second harm, then shouldn't the total cost of the policy be set equal to 2*∑Vi?

Matthew D. Adler, *Risk, Death, and Time: A Comment on Judge Williams' Defense of Cost-Benefit Analysis*, 53 ADMIN. L. REV. 271, 282–83 (2001) (emphasis added); *see also* Lisa Heinzerling, *The Rights of Statistical People*, 24 HARV. ENV'T L. REV. 189, 203–06 (2000) ("One way in which analysts treat the valuation of risk as equivalent to a valuation of life is that they do not calculate the value of both statistical life and life itself. They calculate only the value of statistical life. . . . The value of a discrete risk, however, remains the same regardless of whether anyone actually ends up dying as a result of that risk. Risk and death are two separate injuries."); Ackerman & Heinzerling, *Pricing the Priceless*, *supra* note 138, at 1565 ("In practice, however, analysts often ignore the distinction between valuing risk and valuing life. Many regulations reduce risk for a large number of people and avoid actual death for a much smaller number. A complete [CBA] should, therefore, include valuation of both of these benefits. [But] the standard practice is to calculate a value only for 'statistical' life and ignore life itself.").

140 For reasons described elsewhere, a setback to this welfare-related interest occurs (and should be taken to impact overall well-being) even if those exposed to the risk are not aware of it and so experience no negative mental state (fear, anxiety, stress, etc.) as a result. *See* Waisman, *Moral Context*, *supra* note 5, at 241–43.

## V. EVEN IF THE VSL DID ACCURATELY CAPTURE A MORTALITY RISK'S IMPACT ON OVERALL WELL-BEING, VSL-BASED CBA COULD STILL LEAD TO NORMATIVELY UNSOUND RESULTS

The problems with using VSL-based CBA as a basis for regulating environmental mortality risks go beyond the failure of the VSL to accurately capture the welfare loss associated with premature death. Even if the VSL perfectly captures all the welfare setbacks and losses associated with the imposition of an environmental mortality risk (including the welfare loss associated with premature death itself), VSL-based CBA could still lead to normatively unsound results. Such results may occur because CBA embodies a single norm—maximizing overall well-being—which ignores an aspect of human action that seems highly relevant from a moral point of view: the manner in which the costs and benefits of a given action are distributed among differently situated individuals. Normative pluralism, however, contemplates consideration of *all* normative factors that might bear on determining the morally permissible course of action in a particular case, including factors that *are* sensitive to the distributive aspects of action. In this Part and in Part VI, I argue that when two distribution-sensitive factors—the deontological constraint (or right) against risk imposition and contractualist considerations—are accounted for, it becomes clear that VSL-based CBA may deliver results at odds with the requirements of morality even assuming that the VSL accurately captures the welfare loss associated with premature death.

Let us return to the environmental mortality risk example discussed in Part IV involving the steam electric power plants that impose a 1 in 50,000 risk of premature death on 100,000 subsistence fishers. Recall that the regulation in question would reduce that risk by 1 in 100,000 (from 1 in 50,000 to 1 in 100,000) at a total compliance cost of $12 million, which would be equally distributed among 100,000 electricity customers at a cost of $120 each. Suppose that the risk in question cannot be entirely eliminated without discontinuing the activity of steam-powered electricity generation altogether and that the lowest the mortality risk can be reduced to without threatening the existence of that activity is 1 in 100,000. Suppose also that three further conditions typical of environmental mortality risks hold: 1) none of the subsistence fishers benefit in any meaningful way—whether as consumers, employees, shareholders, or in any other manner—from the operations of the firm whose plant puts them at risk; 2) none of the subsistence fishers shoulder any part of that firm's costs of complying with the regulation at issue (that is, none of the subsistence fishers are customers of the firm whose operations place them at risk); and 3) all of the subsistence fishers benefit significantly from the existence of the general industrial activity being regulated (the steam-powered generation of electricity). In this Part, I will assume that VSL-based CBA *does* accurately capture the impact of a mortality risk imposition on overall well-being such that enacting the risk-reducing regulation at issue would result in lower overall well-being

than would leaving the risk in place undiminished. In that event, would it be normatively defensible for the government to follow the dictates of VSL-based CBA and *not* enact the regulation? Would it, in other words, be morally permissible for the polluting firms not to invest the $12 million necessary to reduce the mortality risk from 1 in 50,000 to 1 in 100,000?

For a normative pluralist, consideration of the regulation's impact on overall well-being does not end the inquiry, as other relevant normative factors must be considered.[141] One relevant factor is the deontological constraint against imposing a risk of harm, discussed in Part III.[142] While we are debating the level of precaution rather than whether any risk is permissible, precautionary decisions *are* ultimately decisions about risk imposition. When the government is considering whether to enact a regulation requiring firms in a particular industry to reduce a risk to a particular level or take specific risk-reducing precautions, it is really determining whether to allow the firm to impose an *additional increment of risk*—the increment that would be eliminated by regulation. In the present example, when VSL-based CBA proscribes the regulation under consideration, it effectively sanctions the imposition of the additional increment of risk that would be eliminated by that regulation: an additional mortality risk of 1 in 100,000. Does the deontological constraint against imposing a risk of harm on others bar the imposition of this additional increment of risk? If so, the polluting firms are then morally required to invest the $12 million necessary to eliminate this risk increment (thereby reducing the total magnitude of the mortality risk from 1 in 50,000 to 1 in 100,000) even if doing so will lower overall well-being.

As discussed in Part III, the constraint against imposing a risk of harm on another person can be overcome when the person exposed to the risk benefits directly from the risk imposition. When the question is whether it is morally permissible for firms to engage in a risky activity at all, the key issue is whether those exposed to the risk benefit from that activity ex ante and on net. In that context, to ask if the risk-bearer benefits from the risk imposition is to ask whether they benefit from the activity that gives rise to the risk. But when the overall question is whether firms engaged in a risky activity are morally required to make a particular investment in risk-reducing measures, the key issue is whether those exposed to the risk benefit not from the activity itself but

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141 For a welfarist consequentialist, it *does* end the inquiry: the regulation is unjustified because it lowers net well-being. Because I believe normative pluralism to be a more plausible theory of normative ethics than a monist theory like welfarist consequentialism, the analysis in the main text assumes a pluralist perspective that, in addition to considering the implications a regulation has for overall well-being, also considers distributionally sensitive considerations such as whether the risk being regulated is being imposed on one group of people to benefit a different group. *See supra* Part II.C.

142 I refer in the main text to a (defeasible) deontological constraint against imposing a risk of harm on another person, but the analysis could also be framed in terms of a (defeasible) right not to be exposed to a risk of harm from another person. *See supra* Part II.

rather from the *monetary savings (or other benefits) that will result if that investment in risk reduction is not made*. In this context, the risk-bearers benefit from the additional risk imposition resulting from a decision not to make a risk-reducing investment only if they are among those who are expected to pay the costs of reducing the risk in question or if they will otherwise benefit from a decision not to make the investment. Where, as would often seem to be the case with environmental mortality risks, those placed at risk do *not* bear any share of the costs of risk-reducing precaution and so fail to realize any monetary benefit from leaving certain precautions untaken, there is an important sense in which a decision not to regulate places an additional increment of risk on one group of people for the sake of providing monetary benefits to a different group of people. And this dynamic, as stated in Part III, is problematic from a moral standpoint.

To illustrate using the above example, the course of action VSL-based CBA dictates—not enacting the regulation at issue—is effectively a decision to impose an additional mortality risk increment of 1 in 100,000 on each of the 100,000 subsistence fishers for the sake of providing a $120 monetary savings to each of 100,000 electricity customers. By hypothesis, the risk-bearing subsistence fishers benefit neither from the activities of the firm whose operations place them at risk nor from the monetary savings resulting from that firm's decision to leave certain precautions left untaken. In this scenario, overcoming the deontological constraint against risk imposition becomes more difficult, because the firm sacrifices one group's interests in order to further the interests of a different group. In essence, a higher risk of premature death is being imposed on the subsistence fishers for the sake of providing cheaper electricity to the polluting firms' customers. More specifically, in order to spare 100,000 consumers from each having to pay a cost increase of $120 (for a total cost of $12 million), 100,000 subsistence fishers are each being exposed to an additional mortality risk of 1 in 100,000, with the result that one additional subsistence fisher is expected to suffer premature death.

For a normative pluralist whose pluralism embraces threshold deontology,[143] whether it is permissible to violate the deontological constraint against imposing a risk of harm on one group of individuals to benefit a different group depends on how great an increase to overall well-being is accomplished by doing so. Where a low risk of premature death is imposed on a very large group of individuals, resulting in one or more expected premature deaths, and where the benefit to be realized from not imposing the risk is entirely monetary in nature and modest in amount for each benefitting individual, the gain to overall well-being would likely have to be quite large in order to override the deontological constraint. To return to the above example, the $12 million cost of enacting the regulation exceeds the $10 million mortality risk reduction benefit by just

[143] For an explanation of threshold deontology, see *supra* note 110 and accompanying text.

$2 million. To the extent this $2 million reflects a loss to overall well-being, it is not plausibly a *large* loss when viewed in the context of a government regulation that impacts 200,000 people. Avoiding a welfare loss of this relatively small magnitude is not likely to justify imposing an additional mortality risk of 1 in 100,000 on a group of 100,000 people when none of them would benefit from the cost savings associated with the risk imposition. Thus, notwithstanding the loss to overall well-being that would occur were the regulation enacted, the regulation may therefore still be required to avoid violation of the deontological constraint against imposition of a risk of harm. Unless the resulting gain to overall well-being is so great as to overcome the threshold on that constraint, it would seem to be morally impermissible for the polluting firms to cease investment in risk-reducing measures at the point dictated by VSL-based CBA. This shows that even assuming it accurately captures the welfare loss associated with premature death, at least in cases where the cost of a regulation does not substantially exceed the resulting safety benefit, VSL-based CBA can underregulate relative to the requirements of morality. To the extent that is the case, the dictates of VSL-based CBA are normatively unsound.

## VI. CONTRACTUALIST CONSIDERATIONS DO NOT SUPPORT USING VSL-BASED CBA TO GUIDE THE REGULATION OF ENVIRONMENTAL MORTALITY RISKS

Might a decision not to enact the regulation under VSL-based CBA be defended on contractualist grounds as working to each risk-bearer's ex ante, net advantage compared with a more stringent approach like feasibility-based regulation? The risk-exposed subsistence fishers may not be customers of the firm whose operations imperil them, but they may be customers of *some* firm or utility that operates steam electric power plants. A subsistence fisher who buys electricity from a firm subject to the regulation at issue would enjoy $120 in cost savings, making the decision not to regulate work to their ex ante, net advantage. But even those subsistence fishers who are not direct customers of any firm or utility that generates electricity likely pay electricity costs indirectly by, for example, paying rent or paying for goods or services with built-in electricity costs. The subsistence fishers *will* likely enjoy some monetary savings (in the form of lower electricity prices) that result from the application of VSL-based CBA to the regulation of environmental mortality risks created by steam electric power plants. Those savings could result in a welfare gain larger than the setback resulting from the additional mortality risk increment subsistence fishers face if the regulation is not enacted (as VSL-based CBA dictates). If so, VSL-based CBA *would* ultimately work to each subsistence fisher's advantage ex ante and on net compared with a more stringent regulatory approach like feasibility analysis; no subsistence fisher could reasonably reject VSL-based CBA as a basis for regulating wastewater-related mortality risk from steam electric power

plants.[144] If successful, this sort of contractualist reasoning may justify using VSL-based CBA for regulating any environmental mortality risk that shares the key characteristics of this risk.

But this argument is ultimately unpersuasive because it rests on a doubtful premise. So long as a subsistence fisher is an active participant in society, one can be certain that they are going to benefit enough from steam-powered electricity generation to make the mortality risk imposition justifiable to them on contractualist grounds as working to their advantage ex ante and on net. This is because the benefits resulting from the activity of electricity generation are plausibly great and the associated mortality risk placed on subsistence fishers is low.[145] Thus, one can make a strong contractualist case for the moral permissibility of engaging in steam-powered electricity generation (plus other risky activities that are socially and economically foundational).[146]

But one cannot be *nearly* as certain that each of the subsistence fishers affected by the regulation will benefit enough from the monetary savings resulting from adoption of VSL-based CBA to make that regulatory approach work to their ex ante advantage (as compared with

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144 The contractualist analysis here is framed narrowly, referring only to the environmental mortality risk that imperils subsistence fishers and the industrial activity that produces the risk. A key question is how broadly to frame candidate principles for the reasonable rejectability inquiry. Should the candidate principles state regulatory standards applicable to all mortality risks resulting from industrial or commercial activities? Only to *environmental* mortality risks resulting from all such activities, excluding consumption risks and workplace risks? Only to the environmental mortality risks created by a *particular* activity? Or only to a *particular* environmental mortality risk created by a *particular* activity? There seem to be two advantages to narrowing the candidate principles. First, because narrower principles are likely to capture factual situations with similar moral profiles, they are more likely to lead to clear and definitive results in the rejectability inquiry. By framing the contractualist analysis in terms of the particular industrial activity that creates the mortality risk—the socially and economically foundational activity of steam-powered electricity generation—the inquiry is restricted to a context in which the risky activity is one that delivers important benefits to all individuals participating in modern society, including those exposed to the activity's mortality risks. This creates a particular moral context that affects the permissibility of different levels of precaution. Second, with narrower principles, one can be more certain of who the most burdened individuals are under the respective candidate principles, and of the nature and magnitude of those burdens. By framing the analysis in terms of a particular mortality risk created by steam electric power plants—the risk of fatal cardiovascular disease from lead in plant wastewater—one can more easily see those exposed to the risk (subsistence fishers), those responsible for paying the costs of risk reduction (electricity customers), and the magnitude of the mortality risk being regulated. Or one might frame the inquiry more broadly as applying to *all* environmental mortality risks generated by industrial or commercial activities. Here, the question would be whether, compared with a more stringent regulatory approach like feasibility analysis, the aggregate increased monetary benefit a risk-exposed individual receives from using VSL-based CBA to regulate such risks outweighs the aggregate increased mortality risk the individual faces as a result. As Sven Ove Hansson has noted, answering questions like this is likely to be very difficult in practice, given the large number of different types of risks and industries involved. *See* HANSSON, *supra* note 7, at 103.

145 *See supra* Part III.

146 *Id.*

a more stringent regulatory approach). Unless a subsistence fisher is a customer of one of the firms subject to the regulation and would be responsible for paying the $120-per-customer compliance cost, they may not enjoy enough of a monetary benefit from leaving risk-reducing measures untaken to make the adoption of VSL-based CBA work to their advantage as compared with adoption of a more stringent regulatory approach. If a subsistence fisher is a customer of a firm or utility that is not subject to the regulation or is not a customer of any firm or utility that generates electricity, there is no guarantee that they will enjoy a monetary benefit from the application of VSL-based CBA that is great enough to outweigh the additional mortality risk they face as a result of the adoption of that standard by the firm whose operations imperil them. Given contractualism's individualist restriction, this argument for VSL-based CBA requires that *each* subsistence fisher exposed to the risk benefit enough from the cost savings from VSL-based CBA to outweigh the cost imposed by the mortality risk they face. If even one subsistence fisher did not, then that individual could reasonably claim that VSL-based CBA does not work to their advantage (ex-ante and on net), undermining the contractualist argument. It seems unlikely that each and every person exposed to the risk would benefit enough from the cost savings resulting from VSL-based CBA to make that precautionary standard work to their ex ante advantage. Thus, because this kind of contractualist argument for VSL-based CBA relies on a doubtful empirical premise, it is unpersuasive.

This raises a key question: if VSL-based CBA is rejected as normatively unsound, what alternative standard should replace it? As I have argued elsewhere,[147] a qualified ex ante contractualist case supports the feasibility approach to regulate mortality risks from foundational industrial activities like electricity generation. Since modern life depends on electricity, anyone who actively participates in modern society necessarily benefits from the industrial activity of electricity generation. Assuming the subsistence fishers participate in modern society and benefit from that activity, the feasibility standard *can* be defended on contractualist grounds as working to the ex ante advantage of the subsistence fishers. Requiring greater investment in risk reduction than is dictated by feasibility analysis is to require a level of risk-reduction that jeopardizes the very existence of the regulated activity; this would deprive the subsistence fisher of the considerable (ex ante and net) benefit they enjoy from that activity.[148] Thus, a decision to cease investing in risk-reducing measures once the feasibility point has been reached *would*

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147 *See generally* Waisman, *Equity and Feasibility*, *supra* note 75 (arguing that feasibility limits in risk regulation are justified by a normative framework that balances equity—understood through ex ante contractualism—against overall well-being).

148 *See id.* at 1316–23; Keating, *Pressing Precaution*, *supra* note 8, at 678, 735–36; *see also supra* Part III (discussing why the existence of foundational industrial activities like electric power generation likely benefits those it imperils ex ante and on net, even considering the mortality risk it imposes on them).

benefit the risk-exposed subsistence fishers even if they bear no part of the cost of such measures.

A different kind of contractualist argument for VSL-based CBA compares the ex ante burdens the regulation would impose on differently situated groups of individuals: the subsistence fishers (who bear the mortality risk) and the electricity customers (who bear the cost of reducing the mortality risk). This argument focuses on the particular burdens that individuals from each group would bear in connection with the regulation: here, an additional incremental mortality risk of 1 in 100,000 for each subsistence fisher and an additional cost of $120 for each customer if the regulation is enacted. It would arguably be *inequitable* to impose a $120 cost on each customer so that each subsistence fisher can experience a 1 in 100,000 reduction in their mortality risk for which, by hypothesis, they would be willing to pay no more than $100. Stated in the language of ex ante contractualism, a customer could reasonably reject a risk regulation principle requiring them to pay $120 so that each subsistence fisher can receive a risk reduction benefit worth only $100. By contrast, a subsistence fisher could *not* reasonably reject a principle requiring them to bear a mortality risk increase equivalent to a $100 cost so that each electricity customer can avoid having to pay a somewhat larger cost.[149] In this way, ex ante contractualism arguably provides normative support for a decision not to enact the regulation at issue. Unlike the first type of contractualist argument considered, this argument does not seek to establish that VSL-based CBA works to the ex ante advantage of each individual exposed to the risk. It seeks instead to establish that VSL-based CBA would impose a lesser burden on each individual exposed to the risk than the alternative regulatory standard (the feasibility approach) would impose on each individual who bears the costs of reducing that risk, making it unreasonable for the risk-bearers to reject VSL-based CBA as a standard for regulating environmental mortality risks.

But this argument does not actually support VSL-based CBA. At most, it supports an individualized form of CBA that, rather than comparing aggregate benefits to aggregate costs, compares the benefit to each beneficiary with the cost to each cost-bearer. In the risk regulation context, individualized CBA rests on a principle I have termed the *individual risk principle*.[150] This principle requires each cost-bearer to

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[149] *See* SCANLON, WHAT WE OWE TO EACH OTHER, *supra* note 112, at 229 (calling attention to the central feature of contractualism: "its insistence that the justifiability of a moral principle depends only on various *individuals'* reasons for objecting to that principle and alternatives to it" (emphasis in original)); *see also* Scanlon, *Contractualism*, *supra* note 112, at 111 ("[T]he qualification 'reasonably' . . . exclude[s] rejections that would be unreasonable *given* the aim of finding principles which could be the basis of informed, unforced general agreement.").

[150] Waisman, *Reasonable Precaution for the Individual*, *supra* note 100, at 677 ("[T]he individual risk principle says to invest in safety precaution until the point at which further expenditure would decrease each cost-bearer's well-being by more than it would increase each risk-bearer's expected well-being.").

invest in reducing each risk-bearer's mortality risk until the risk-bearer themselves would rationally cease investing in their own safety were they to bear each cost-bearer's share of the regulatory costs.[151] Individualized CBA uses willingness-to-pay to quantify and monetize the benefit associated with a reduction in each risk-bearer's risk of premature death, comparing this with the monetary cost each cost-bearer would have to pay to subsidize that reduction.[152] In this example, the individual risk principle precludes the regulation, because, given the assumptions in Part IV, no risk-bearer would rationally pay $120 (each cost-bearer's share of the compliance cost) to accomplish a 1 in 100,000 reduction in their own mortality risk that is worth just $100.

To see that ex ante contractualism (and the individualized form of CBA it supports) will not always accord with the dictates of VSL-based CBA, consider a variation of the regulatory example we have been discussing. Suppose that, instead of being equally divided among 100,000 electricity customers, the regulation's $12 million compliance cost would be evenly spread among *1 million* customers, making the cost to each customer $12 rather than $120. VSL-based CBA would still prohibit the regulation in question, since its total monetized cost ($12 million) would still exceed its total monetized benefit ($10 million). But, from the perspective of ex ante contractualism and individualized CBA, the regulation is now morally required, as it would be unreasonable for a customer to reject a principle requiring them to pay a $12 cost so that a subsistence fisher can avoid an additional mortality risk increment that is equivalent to a $100 cost. Although the aggregate cost of the regulation remains greater than its aggregate benefit (making it morally impermissible from the standpoint of CBA and overall well-being), the regulation's per-individual ex ante cost is now *less* than its per-individual ex ante benefit (making it morally required from the standpoint of ex ante contractualism). Thus, although the regulation fails to be cost-justified under VSL-based CBA, it *is* cost-justified under the individual risk principle. So, ex ante contractualism will support the results of VSL-based CBA only where they happen to align with those of individualized CBA. Thus, like the argument described in Part V, the contractualist argument discussed here fails to provide normative support for VSL-based CBA.

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151 This essentially implements a single-owner notion of risk regulation on an individualized basis. *See id.* at 677 (noting that individual risk principle represents an individualized "single-owner" approach to risk regulation); *cf.* Kenneth W. Simons, *Deontology, Negligence, Tort, and Crime*, 76 B.U. L. REV. 273, 282 (1996) (describing a "'single owner' conception" of CBA "which asks what the actor . . . would do if he owned all the resources in question and would therefore internalize all the costs and benefits of the decision").

152 *See* Waisman, *Reasonable Precaution for the Individual*, *supra* note 100, at 678–79 ("[T]he individual risk principle compares the monetary cost of the precaution to each individual cost-bearer against the resulting increase in safety experienced by each individual risk-bearer."); Simons, *supra* note 151, at 282.

## VII. CONCLUSION

In this Article, I have argued that cost-benefit analysis centered around the value of a statistical life is not a normatively sound basis on which to regulate environmental mortality risks. The norm of welfare maximization does not support VSL-based CBA. Even if it did, VSL-based CBA could still lead to normatively unsound results given that it ignores the deontological constraint against imposing a risk of harm, a constraint that is difficult to overcome where the risk is imposed on one group of people for the sake of benefitting a different group. VSL-based CBA is also insensitive to the impact of mortality risk regulation at the level of the individual risk-bearer and the individual cost-bearer, so finds no support from contractualist considerations. Thus, for environmental mortality risks, VSL-based CBA lacks a normative foundation. It should play no role in guiding the regulation of such risks.

One may worry that, if VSL-based CBA is rejected, there is no principled basis for limiting expenditures on mortality risk reduction. It is implausible that an infinite amount of money should be spent to prevent a single statistical death.[153] The VSL, based on the collective willingness to pay to reduce a mortality risk by a specified amount, may seem like a defensible construct for placing a dollar value on the benefit of preventing a statistical death. While the VSL may have flaws as a construct, no construct is perfect and the alternative is to regulate mortality risks without regard to monetary cost, which is neither practical nor rational.[154]

But the two major regulatory alternatives to VSL-based CBA in U.S. law—feasibility-based regulation and safety-based regulation—both impose limits on investments in risk-reducing measures. The feasibility approach caps such investments at the point at which further investment would threaten the survival of the regulated industries, while the safety approach requires investment only until the regulated risk is reduced to a specified level.[155] Neither alternative approach contemplates an infinite investment in mortality risk reduction, and, while the safety approach does not take into account the cost of risk reduction, the feasibility approach *is* sensitive to the cost of regulatory compliance to the extent that the cost threatens the survival of the regulated industries. Though this may require a large investment in risk-reducing measures, it will not require an infinite investment. A large investment in risk reduction seems justified in this context, given that those exposed to the risk derive no benefit from the activities of the risk-imposing firm, their lives being

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153 *See, e.g.*, Pressman, *supra* note 16, at 1522 ("[I]t does not seem as though pricing the hedonic loss [associated with premature death] at an infinite number of dollars . . . is the answer we want.").

154 *See id.* at 1524 ("[VSL] is a mere construct, because if asked how much money one would accept for having one's life end immediately, there is no sum that one would accept. But that is precisely why we are in search for a construct—because seemingly without one we are unable to put a dollar sum on losing the entire remainder of one's life.").

155 *See supra* Part II.B.

imperiled for the sake of providing consumption, employment, and other types of benefits to distinct groups of individuals. Such non-benefitting risk-bearers can reasonably demand, as a price of being so imperiled, that the risk they face be reduced to the point at which they themselves would be disadvantaged were it reduced further.