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VALUING FATAL CANCER AT THE EPA

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INTRODUCTION

Imagine a widget factory in a small community. The factory's production process requires a significant amount of heavy machinery and produces as a byproduct a carcinogen that is released into the air of the community. On the same day, two events occur. First, a worker at the widget factory slips and falls into a piece of heavy machinery, dying instantly.[1] Second, a new family moves to the community with a ten-year-old child, who is exposed to the plant's

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1. Or as close to instantaneously as possible. *See generally* David W. Leebron, *Final Moments: Damages for Pain and Suffering Prior to Death*, 64 N.Y.U. L. Rev. 256 (1989) (discussing near-instantaneous deaths).

pollutant for the first time. Twenty years later, she develops cancer and slowly passes away.

The two deaths are dissimilar in all but their ultimate outcome. The quickness of the worker's death precluded morbidity in that there was no opportunity for him to experience sickness, physical suffering, and decreased quality of life before he died. The same immediacy of death all but eliminated any fear of death, associated emotional suffering, or dread, beyond what he may have felt on the job every other day. While he died instantly, the child endured a period of morbidity, fear, and dread while attempting to overcome her condition.

Stark differences aside, the parallel horrors share a common core: the administrative state might have regulated the cause of each harm. Maybe the factory's safety processes and machinery were the subject of federal agency rulemaking. Similarly, perhaps the Environmental Protection Agency (EPA) had authority to regulate the factory's carcinogenic pollutant emissions. If so, any rules targeted at regulating either scenario would likely undergo a cost-benefit analysis, which is an analytical process for determining the attractiveness of regulatory action under the following rubric: "Where all benefits and costs can be quantified and expressed in monetary units, [it] provides decision makers with a clear indication of the . . . alternative that generates the largest net benefits to society."[2] The reduction in mortality risk—the risk of death that arises from an occurrence—provides a substantial component of estimated benefits.

In the United States, withstanding a cost-benefit analysis is a prerequisite to viability for certain types of regulations, including many of those the EPA promulgates.[3] For many regulatory actions, particularly in the environmental context, the primary benefit gained is the protection of human health, specifically in the reduction of mortality risk.

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2. U.S. Office of Mgmt. & Budget, Circular A-4, at 2 (Sept. 17, 2003), https://www.transportation.gov/sites/dot.gov/files/docs/OMB%20Circular%20No.%20A-4.pdf [https://perma.cc/SYU6-WAK7] [hereinafter Circular A-4].

3. *See, e.g.*, Michigan v. EPA, 135 S. Ct. 2699, 2707 (2015) (holding that the EPA must consider costs when judging if a regulation is "appropriate and necessary"). Regulatory analysis of this nature is required (though to what extent is a matter of much controversy and litigation, depending on the subject matter) by federal law as interpreted by the courts. Such analysis is also mandated within the executive branch through executive orders that direct the behavior of agencies. *See* Exec. Order No. 13563, 76 Fed. Reg. 3,821 (Jan. 18, 2011). Requirements of agency cost-benefit analysis are discussed in more detail *infra* Part I.

Regulators quantify reductions in mortality risk using a statistical figure called the "value of a statistical life" (VSL).[4] VSL is calculated by extrapolating data regarding individuals' willingness to pay to avoid tiny risks of death.[5] However, by only considering individuals' willingness to pay to avoid death generally, the underlying studies used to estimate VSL fail to adequately capture the costs endemic to latent fatalities, such as the dread, morbidity, and fear in the time between exposure and death.[6] Cancerous death is the paradigmatic latent harm.

The juxtaposition of the two hypothetical deaths described above raises the question of whether, for the purposes of VSL calculations, the mortality risk that latent harms pose should be valued similarly to that of instantaneous harms. Suppose the probability of death the worker and the child faced from the risks that ultimately killed them was equal. In that case, under a generic valuation of life (i.e. one that does not consider cause or nature of death), cost-benefit analysis would equally value preventing each of the deaths, meaning both would yield the same regulatory benefit. This would justify equally cumbersome regulations on both heavy machinery and carcinogenic emissions. But such a regulatory outcome is normatively suboptimal and empirically inaccurate. Individuals value preventing cancerous deaths more than instantaneous ones because the former entails morbidity accompanied by the fear and dread of impending death.[7] The state should therefore be willing to impose additional regulatory costs to prevent the cancerous death as a means of accounting for the aggregate dread, morbidity,

4. CIRCULAR A-4, *supra* note 2, at 29–31.

5. *Id.* at 29–30 (noting that studies generally use a risk of death "in the range of 10^{-4} annually" and "have no applications to . . . very large reductions in individual risks"). Using such miniscule probabilities makes sense because "[m]ost regulatory actions involve the reduction of risks of low probability (as in, for example, a one-in-10,000 annual chance of dying in an automobile crash." Memorandum from Polly Trottenberg, Under Sec'y, & Robert S. Rivkin, Gen. Counsel, U.S. Dep't of Transp., to Secretarial Officers & Modal Adm'rs, U.S. Dep't of Transp., *Guidance on Treatment of Economic Value of a Statistical Life in U.S. Department of Transportation Analyses* (Feb. 28, 2013), https://www.transportation.gov/sites/dot.dev/files/docs/VSL%20Guidance_2013.pdf [https://perma.cc/J7DR-LZRL]. For example, "when an individual is willing to pay $1,000 to reduce the annual risk of death by one in 10,000, she is said to have a VSL of $10 million." *Id.*

6. *See infra* Part I.B.

7. *See, e.g.*, U.S. ENVTL. PROT. AGENCY SCI. ADVISORY BD., EPA-SAB-2017-005, SAB REVIEW OF EPA'S PROPOSED METHODOLOGY FOR UPDATING MORTALITY RISK VALUATION ESTIMATES FOR POLICY ANALYSIS 50–51 (2017) [hereinafter SAB 2017 REVIEW].

latency, and fear endemic to experiencing latent harms.[8] A question arises then of how the state may do so.

This Note demonstrates that agency regulatory analysis should value latent harms differently from instantaneous harms. Further, it argues for a mechanism that will allow the EPA to increase the regulatory costs that may be levied to reduce the emission of carcinogens by more precisely valuing the prevention of fatal cancers in such analysis. Though this Note is narrow, focusing solely on cancer and the EPA, it enters the broader debate of valuing life for regulatory purposes at an apt intersection. The EPA is arguably the most sophisticated and cutting-edge agency that employs VSL, and latent harms constitute a distinct class of ailments that portend death.[9]

Scholars have advocated that the EPA should—and the Agency itself has previously considered whether to—increase the regulatory benefit of preventing cancerous deaths through the imposition of a "cancer differential." A cancer differential reflects an upward adjustment of VSL that accounts for morbidity, fear, and dread. The differential, also known as a cancer premium, would act as a multiplier for the generic VSL value in cost-benefit analysis, considering harms that are currently excluded from regulatory math. The multiplier effectively leads to more stringent regulation of carcinogens by allowing regulators to impose higher costs on various industries through pollution restrictions, in turn saving more lives.

Consider the following hypothetical which, though stylized to promote clarity, illustrates the benefit of the EPA adopting a cancer differential. With reference to the introductory example, say the EPA had instead chosen to regulate the pollutant that killed the child (assuming statutory authority exists and requires the measure to pass a cost-benefit analysis). That pollutant—which, without regulation, causes 150 cancerous deaths per year—can be regulated at Level 1 (the most stringent), Level 2 (somewhat stringent), or Level 3 (the least stringent) with annual compliance costs to the polluter varying accordingly. The regulation is expected to prevent 20 cancerous deaths at Level 3 (at a cost to polluters of $100 million), 50 deaths at Level 2 (at a cost to polluters of $600 million), and 100 deaths at Level 1 (at a cost to polluters of $2 billion). For the sake

8. Regulatory cost-benefit analysis is predicated on preferences in society to the extent that the value of preventing death is monetized as a regulatory benefit based on aggregate preferences.

9. *See* Michael A. Livermore, *Cost-Benefit Analysis and Agency Independence*, 81 U. CHI. L. REV. 609, 626–29 (2014) (noting the EPA's sophistication as an agency in terms of economics).

of simplicity, assume a VSL of $10 million with a 50% cancer differential and no other costs or benefits than those listed above.

A cancer differential will make a difference in the regulatory outcome. As a baseline matter, without any quantified VSL, which reflects the monetization of benefits accrued through implementation of a regulation, the EPA would not be able to impose any level of regulation because there would be no regulatory benefit to outweigh the imposition of costs. Once we begin factoring in a VSL and cancer differential, there are several scenarios in which the regulation can survive cost-benefit analysis. Level 1, the most stringent regulation, is economically infeasible regardless of whether a cancer differential is implemented since the benefits provided by enacting the regulation will always be smaller than the expected cost of $2 billion.[10] Level 3, in contrast to Level 1, is cost-benefit-justified regardless of whether a cancer differential is utilized because the benefits will always outweigh the costs to the polluter.[11] However, for Level 2, the cancer premium makes a difference. That standard of regulation would fail a cost-benefit analysis without the cancer differential but would pass with one.[12] Though contrived, this example is emblematic of the stakes of valuing mortality risk. A cancer differential in this scenario would prevent thirty additional cancerous deaths by permitting the EPA to enact regulations that are more stringent.

While the EPA has suggested a cancer differential in the past, an outside group of advising experts dissuaded the Agency from adopting one.[13] Part of the problem is that discussion of tailoring VSL to cancerous fatalities has occurred within a much broader conversation. This larger debate concerns individuating VSL figures across different types of mortality risks and demographics, thereby mapping more closely the nuanced contours of individual charac-

10. VSL without cancer differential for Level 1: 100 lives × $10 million= $1 billion. VSL augmented by a cancer differential: 100 lives × $15 million= $1.5 billion. Neither level of benefit, $1 billion or $1.5 billion, outweighs the $2 billion cost.

11. VSL without cancer differential for Level 3: 20 lives × $10 million= $200 million. VSL augmented by a cancer differential: 20 lives × $15 million= $300 million. The benefit would exceed the $100 million cost regardless of whether a differential is implemented.

12. VSL without cancer differential for Level 2: 50 lives × $10 million= $500 million. VSL augmented by a cancer differential: 50 lives × $15 million= $750 million. Imposing a cancer differential would allow the benefits of the regulation, $750 million, to outweigh the costs, $600 million. Without a differential the costs, $600 million, would outweigh the benefits, $500 million.

13. *See infra* Part II.A–B.

teristics.[14] For example, there may be differences in how individuals value risk reductions based on who they are (race, age, gender, etc.) or what risks they face (environmental pollution, terrorism, airplane crashes, etc.). Individuation seeks to map these discrepancies as specifically as possible to allow regulation to reflect preferences at lower levels of aggregation (sub-groups instead of the entire affected population). Under this view, quantification of mortality risk occurs under a more normatively ambiguous rubric that would, for example, require a higher VSL for wealthier populations (say, in a rulemaking affecting air travel, generally the province of a richer segment of society).[15] However, this approach, which I will critique in Part III.C, is predicated on questionable moral underpinnings and would not be feasible to implement. Further, individuation diminishes the need for a cancer differential in regulatory analyses because its focus is much broader and systemic; cancerous death is merely another sub-category of risk in a set of many such sub-categories.[16]

There is significant literature that justifies instituting a cancer differential,[17] and an initial estimated differential should be implemented as soon as practicable. The immediate imposition of such a measure will prevent the marked undervaluation of fatal cancer risks in the short term and preserve the option for the EPA to adopt a refined estimate in the long term. The benefits of even a low-end interim estimate of a cancer differential outweigh the justifications for delay. A differential would lead to more stringent regulations, thus saving lives in the intervening period by allowing regulators to impose higher costs on industry in exchange for a healthier population. Employing such an interim ratio is not only normatively desirable and empirically justified but also consistent with American

14. *See infra* Part III.C.

15. *See* W. Kip Viscusi, *Heterogeneity of the Value of Statistical Life and Policy Concerns, in* BENEFIT-COST ANALYSES FOR SECURITY POLICIES 78, 94 (Carol Mansfield & V. Kerry Smith, eds. 2015).

16. *See infra*, notes 72–74 and accompanying text.

17. *See, e.g.*, Anna Alberini & Milan Scasny, *Context and the VSL: Evidence from a Stated Preference Study in Italy and the Czech Republic*, 49 ENVTL. & RESOURCE ECON. 511 (2011); Rebecca L. McDonald et al., *Dread and Latency Impacts on a VSL for Cancer Risk Reductions*, 52 J. RISK & UNCERTAINTY 137 (2016); George Van Houtven et al., *Cancer Premiums and Latency Effects: A Risk Tradeoff Approach for Valuing Reductions in Fatal Cancer Risks*, 36 J. RISK & UNCERTAINTY 179 (2008); Anna Alberini & Milan Scasny, *Labels and Perceptions in Mortality Risk Reduction Valuations* (June 30, 2010), http://www.webmeets.com/WCERE/2010/Prog/viewpaper.asp?pid=228 [https://perma.cc/TL4T-9E3H].

administrative practice and international administrative policy norms, as discussed in Part III.B.

Part I of this Note provides background on the role of VSL[18] in cost-benefit analysis in the American administrative state, explaining the uniqueness and difficulty of quantifying latent harms for the purpose of regulatory analysis. Part II analyzes instances in which the EPA previously considered valuing fatal cancer risks, including its flawed rejection of a proposed temporary differential.[19] Part III advocates for the adoption of a cancer differential, finding support in foreign nations' effective treatments of cancerous fatalities and the U.S. adoption of sophisticated techniques for quantifying regulatory benefits. Part III concludes by rejecting broader tailoring of VSL as supporters of individuation advocate.

I.
BACKGROUND

Part I locates this Note within the framework of the regulatory state. First, it provides background on the role of cost-benefit analysis in administrative lawmaking, elucidating the methodology behind valuing reductions in mortality risk as a benefit of regulation. Next, it explores the current process for compiling VSL measurements, which does not account for demographic or risk characteristics but simply calibrates one catchall figure. This methodology is incapable of accounting for the additional monetary value that should be attributed to latent harms.[20]

18. Note that the EPA has concerns about the use of the term "value of a statistical life," noting that perhaps "value of risk reduction for mortality" may be a preferable term "for communication with non-economists" to facilitate "better understanding of the concept." SAB 2017 Review, *supra* note 7, at 2. Consistent with most of the literature in the field and broader agency practice in the administrative state, this Note will continue to use "value of a statistical life" or "VSL" for expediency. The EPA's new 2016 White Paper also uses such nomenclature, though it mentions the intent to change the VSL moniker upon the updating of that value. U.S. Envtl. Prot. Agency, Valuing Mortality Risk Reductions for Policy: A Meta-Analytic Approach 2 (Feb. 2016) [hereinafter 2016 EPA White Paper].

19. This Note focuses on the EPA because it has entertained employing a cancer differential, it is among the most sophisticated health and safety agencies, and its rulemakings have massive impacts.

20. For further explanation of why the methodology behind VSL is incapable of capturing latent harms, see *infra*, Part I.B.

A. Cost-Benefit Analysis and VSL in the Regulatory State

In the modern administrative state, a large swath of law is made not in the chambers of Congress but in the halls of administrative agencies. One central tool in the executive branch lawmaking effort is cost-benefit analysis, which provides a means of determining whether to adopt a policy proposal by aggregating its effects in monetized form.[21] The primary utility of such analysis is helping "[t]o improve the quality and effectiveness of federal rules and minimize burden."[22] The Office of Management and Budget (OMB) requires executive branch agencies, like the EPA, to perform cost-benefit analyses when such agencies promulgate rules that will result in an economic impact of at least $100 million or otherwise "adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities."[23] This mandate requires agencies to submit a quantified cost-benefit analysis, which includes providing a rule's projected monetized costs and benefits as well as an examination of regulatory alternatives.[24]

Beyond the OMB's requirements, agencies within and outside of the executive branch face requirements of cost-benefit analysis originating from other sources. For example, statutory requirements to conduct cost-benefit analyses bind many agencies.[25] In

21. Of course, such discussion of cost-benefit analysis is less meaningful without precisely identifying the cost-benefit paradigm in use, and there exist several applicable frameworks. For example, some theories of cost-benefit analysis implicate the use of the tool both quantitatively and qualitatively. *See* Robert W. Hahn & Cass R. Sunstein, *A New Executive Order for Improving Federal Regulation? Deeper and Wider Cost-Benefit Analysis*, 150 U. PENN. L. REV. 1489, 1498–99 (2002). Similarly, some advocate for a cost-benefit approach that "disavows the ambition of monetization." Rachel Bayefsky, Note, *Dignity as a Value in Agency Cost-Benefit Analysis*, 123 YALE L. J. 1732 (2014) (discussing various cost-benefit paradigms). However, this Note should be understood as applicable within the current architecture embraced by the American regulatory state, a system that skews toward monetization.

22. MAEVE P. CAREY, CONG. RESEARCH SERV., 7-5700, COST-BENEFIT AND OTHER ANALYSIS REQUIREMENTS IN THE RULEMAKING PROCESS 1 (2014).

23. Exec. Order No. 12866 §§ 3(f)(1), 6(a)(3)(C); 3 C.F.R. 638 (1994).

24. *Id.*

25. *See, e.g.*, Commodity Exchange Act, 7 U.S.C. § 19(a) (2012) (providing the Commodity Futures Trading Commission "shall consider the costs and benefits of the action of the Commission"); Safe Drinking Water Act, Pub. L. No. 104-182 (1996) (adding a cost-benefit analysis requirement to the Safe Water Drinking Act).

other instances, courts have found statutes to require or at least allow for cost-benefit analyses.[26]

As agencies' analyses of proposed regulations have grown more sophisticated, cost-benefit calculations are increasingly able to quantify regulatory benefits and costs that previously could not be measured. Enhanced economic analysis capacities, driven by the hiring of economists and their increased importance in the regulatory process,[27] along with innovation of scientific techniques for quantifying regulatory costs and benefits, have enabled agencies to better translate outcomes into figures.[28] Moreover, as agencies have enhanced their ability to quantify costs and benefits, courts have

26. *See, e.g.*, Michigan v. EPA, 135 S. Ct. 2699 (2015); Entergy Corp. v. Riverkeeper, Inc., 556 U.S. 208, 223 (2009).

27. This is especially true at the EPA. *See* Livermore, *supra* note 9, at 626–29.

28. *See* Richard L. Revesz, *Quantifying Regulatory Benefits*, 102 CALIF. L. REV. 1423, 1436–50 (2014). For example, agencies can now calculate many complex regulatory benefits that they were once unable to, including (1) the lessening of generic mortality risk, as captured through a VSL figure, *id.* at 1436–39; (2) the reduction by one ton of carbon dioxide emissions, as measured through the Social Cost of Carbon (SCC), *id.* at 1439–42; *see EPA Fact Sheet: Social Cost of Carbon*, U.S. ENVTL. PROTECTION AGENCY (Dec. 2015), http://www3.epa.gov/climatechange/Downloads/EPAactivities/social-cost-carbon.pdf [https://web.archive.org/web/20170121004634/http://www3.epa.gov/climatechange/Downloads/EPAactivities/social-cost-carbon.pdf] [hereinafter *EPA Fact Sheet: Social Cost of Carbon*]; (3) the preservation of ecosystems, including "provisioning services," "regulating services," "supporting services," and "cultural services" with various human and environmental ends, Revesz, *supra* at 1442–44 (citing Shuang Liu et al., *Valuing Ecosystem Services: Theory, Practice, and the Need for a Transdisciplinary Synthesis*, ANNALS N.Y. ACAD. SCI. (Feb. 2010), at 54); (4) the limiting of psychological harms such as "fear, anxiety, and stress," Revesz, *supra* at 1444–47; *see generally* Medical Devices; Patient Examination and Surgeons' Gloves; Test Procedures and Acceptance Criteria, 68 Fed. Reg. 15,404 (Mar. 31, 2003) (codified at 21 C.F.R. pt. 800); Matthew D. Adler, *Fear Assessment: Cost-Benefit Analysis and the Pricing of Fear and Anxiety*, 79 CHI.-KENT L. REV. 977 (2004) (discussing the Food and Drug Administration's approach to valuing anxiety pertaining to a proposed rule for heightening quality specifications for medical examination gloves); and (5) the ability to delay decisions that might negatively affect the environment, such as offshore oil leasing licenses, Revesz, *supra* at 1447–50 (citing Michael A. Livermore, *Patience Is an Economic Virtue: Real Options, Natural Resources, and Offshore Oil*, 84 U. COLO. L. REV. 581, 586 n.13 (2013)). These measures have in turn been used to conduct the regulatory analysis that underlies agency regulations ranging from setting fuel economy requirements, *see* 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62,623 (Oct. 15, 2012), to regulating arsenic in drinking water, *see* U.S. ENVTL. PROT. AGENCY, OFFICE OF GROUNDWATER & DRINKING WATER, ARSENIC IN DRINKING WATER RULE ECONOMIC ANALYSIS, EPA 815-R-00-026 (2000), http://yosemite1.epa.gov/ee/epa/ria.nsf/vwAN/W200012A.pdf/$file/W200012A.pdf [https://perma.cc/U58G-AZEB].

begun to more heavily scrutinize agency rulemaking. This is particularly true in the Court of Appeals for the District of Columbia where the bulk of the federal administrative and regulatory docket lands. Such stringent judicial review has spurred adaptation and improvement of cost-benefit analysis as agencies scramble to prevent the invalidation of vital rulemakings.[29] Collectively these changes have catalyzed a boom in quality regulatory analysis and emboldened agencies in their analytical efforts.[30]

Despite advancements in the quantification of costs and benefits, valuing mortality risk has always been particularly challenging in the environmental context. One reason for this difficulty is that EPA regulations create risk reductions that "are inherently public in nature," as opposed to "private purchase decisions," because the EPA's mandate includes protecting the resources that are common to us all, like air and water.[31] This matters because individuals might value the reduction of risk from public policies differently than their private choices, perhaps "due to differences in 'controllability,' 'dread' or other tangible or intangible factors," thus complicating quantification efforts.[32] For example, reducing risk from toxic air or water may be more highly valued than an equivalent reduction in risk from individual behavior, such as tobacco use, because large-scale risks that no one individual controls are part of the public sphere.[33] Another prevalent challenge in environmental regulatory math is the intertwined nature of morbidity and mortality risk.[34] Carcinogens that the EPA regulates produce latent harms that include a period of morbidity preceding death. Delineating these effects—separating the toll and impact of cancer illness with that of a death from the disease—can be difficult.

Determining mortality risk is vital to the EPA's calculations of VSL. After all, preventing fatalities is the "primary benefit" of many

29. *See, e.g.*, Business Roundtable v. SEC, 647 F.3d 1144, 1148–49 (D.C. Cir. 2011) (vacating SEC rule because the agency failed to assess costs and benefits based on sufficient economic data); Catherine M. Sharkey, State Farm *"with Teeth": Heightened Judicial Review in the Absence of Executive Oversight*, 89 N.Y.U. L. Rev. 1589, 1632–34 (2014).

30. *See* Sharkey, *supra* note 29, at 1632–34.

31. U.S. Envtl. Prot. Agency, Valuing Risk Reductions for Economic Policy: A White Paper 7 (2010) at 7 [hereinafter 2010 EPA White Paper].

32. *Id.* at 8.

33. *See* Maia Szalavitz, *10 Ways We Get the Odds Wrong*, Psychology Today (Jan. 1, 2008), https://www.psychologytoday.com/articles/200801/10-ways-we-get-the-odds-wrong [https://perma.cc/5N3M-5ND2] ("We prefer that which (we think) we can control.").

34. 2010 EPA White Paper, *supra* note 31, at 8; *see infra* notes 129–30 and accompanying text.

of the key statutes that authorize EPA rulemaking.[35] Calculating a VSL was among the earliest cost-benefit challenges facing regulatory officials. Prior to President Reagan's Executive Order 12291, which required executive branch agencies to create and submit regulatory impact analyses to the OMB,[36] many agencies did not even attempt to quantify risks to life.[37] The need to create regulatory impact analyses under that Executive Order spurred agencies to begin developing rigorous techniques for quantifying the effects of their regulations.

The VSL figure represents not the worth of a specific life or even of the certainty of death, but rather "a summary measure for the dollar value of small changes in mortality risk experienced by a large number of people."[38] VSL is calculated through the use of "willingness-to-pay studies," meaning the aggregation of expressions of individual valuations of different outcomes.[39] Simply stated, researchers ask, either explicitly or implicitly by reference to economic choices, how much individuals are willing to pay to forgo a small mortality risk. Say a group is willing to pay, on average, one thousand dollars to forgo a mortality risk of one in ten thousand. The VSL for this group would be ten million dollars (the amount these individuals are willing to pay multiplied by the mortality risk).

Willingness to pay is measured through two types of studies: wage-risk and contingent valuation.[40] The wage-risk methodology, also called "hedonic wage," values mortality risk through examining "the income-risk trade-offs made by workers for on-the-job risks."[41]

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35. Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 943 (1999); *see, e.g.*, 42 U.S.C. § 7401 (2013) (identifying the purpose of the Clean Air Act as including "promot[ing] the public health and welfare").

36. Exec. Order 12291; 46 Fed. Reg. 13,193 (Feb. 17, 1981).

37. Eric Posner & Cass R. Sunstein, *Dollars and Death*, 72 U. CHI. L. REV. 537, 549 (2005); Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1437.

38. ENVTL. PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES, at xv (Dec. 17, 2010), http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf [https://perma.cc/4A2P-9HWK] [hereinafter EPA GUIDELINES FOR PREPARING ECONOMIC ANALYSES].

39. Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1437. This method is "standard federal agency practice." *Id.* at 1439 (citing Revesz, *Environmental Regulation*, *supra* note 35, at 955; W. Kip Viscusi, *Monetizing the Benefits of Risk and Environmental Regulation*, 33 FORDHAM URB. L.J. 1003, 1018 (2006)).

40. Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1436–37; *see* Revesz, *Environmental Regulation*, *supra* note 35, at 955 & n.60 (referring to efforts to value life through willingness to pay as early as 1968).

41. EPA GUIDELINES FOR PREPARING ECONOMIC ANALYSES, *supra* note 38, at 7–10.

By comparing wages for jobs that entail different fatality risks, economists can implicitly place a value on mortality risk. In contrast, contingent valuation methodology, also known as "stated preference," directly asks participants what they would pay to lessen the probability of a risk of death.[42]

Current EPA guidance provides for a VSL estimate of $7.4 million (in 2006 dollars, closer to $9 million today) to be used during rulemaking.[43] The figure is an average of labor-market, hedonic-wage studies, and contingent-valuation studies.[44] Further, the estimate is generic in that it does not account for specific risk characteristics, such as latency.

B. Latent Harms Versus Instantaneous Harms

Instantaneous harms are different from latent harms in that the latter develop and manifest over time. A paradigmatic instantaneous harm[45] is a truck driver[46] falling asleep at the wheel on a long-haul journey and crashing into a barrier at highway speeds, causing immediate death. The driver would ostensibly not have suffered or experienced the fear of impending death. There is no delay before death and thus no opportunity for her to feel fear not already present when she signed up for the job. A representative latent harm would be an individual developing a cancer that slowly kills her, manifesting dozens of years after exposure to a toxin she did not know was present in the water supply. In this situation, the individual would likely experience morbidity, fear, and dread because she knows she has a fatal disease. From this comparison, one can see that instantaneous harms differ from latent harms most fundamentally in terms of timing,[47] as latent harms occur long after

42. Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1437. Stated preference studies are becoming more prevalent in gauging willingness to pay. *Id.*

43. EPA GUIDELINES FOR PREPARING ECONOMIC ANALYSES, *supra* note 38, at B-1.

44. *Id.*

45. Roughly 85% of workplace deaths occur the same day as the precipitating accident. Forty percent relate to accidents involving falls or heavy equipment, while 45% stem from transportation. Ikuho Kochi & Laura Taylor, *Risk Heterogeneity and the Value of a Statistical Life: Further Market-Based Evidence*, at 2 n.1 (2011), http://economics.appstate.edu/sites/economics.appstate.edu/files/kochi_taylor_asu.pdf [https://perma.cc/W4PA-6Y33]

46. Many hedonic wage studies target truck drivers.

47. *See* NAT'L CENTER FOR ENVTL. ECON., EPA-SAB-EEAC-00-013, AN SAB REPORT ON EPA'S WHITE PAPER VALUING THE BENEFITS OF FATAL CANCER RISK REDUCTION 5 (2000) [hereinafter SAB 2000 REVIEW]. However, the timing discrepancy has largely been solved by the adoption of discounting in cost-benefit analysis as advocated by Revesz. *See generally* Revesz, *Environmental Regulation*, *supra* note 35, at 984 ("Discounting is . . . necessary to provide an accurate value of the utility that

the initial cause.[48] Morbidity, fear, and dread are derivative of timing in the sense that one may only experience these things if there is time between a precipitating event and fatality.[49] As such, these characteristics do not factor into instantaneous harms.

The differences between latent and instantaneous harms has led Professor Richard Revesz to argue that latent harms are undervalued. Revesz advocates for adjusting VSL for such harms through certain "[u]pward adjustments . . . to account for the dread and involuntary nature of environmental carcinogens."[50] He maintains that such adjustments would prevent the undervaluation of life, particularly in the context of harms with longer latency periods.[51] As his focus on carcinogens implies, cancer is a paradigmatic example of a latent harm.

The undervaluation of cancerous harms is in part a function of how agencies value mortality risk. The methodology for calculating VSL, which has remained largely consistent in its essential form for decades, insufficiently values deaths from latent harms. Consider the EPA's VSL figure whose estimate stems from the vetting and weighing of twenty-six studies.[52] Of that collection, twenty-one studies are labor market studies that use wage-risk data.[53] These studies implicate instantaneous risks—either explicitly, as with a contingent valuation study of immediate death from a road accident, or implicitly through examining wage data—and thus do not capture the unique aspects of latent harms.[54]

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the individual loses in the present as a result of a premature death that might occur in the future.").

48. However, while the dread and fear engendered by time between injury and death often cuts in favor of increasing valuation, some commentators point out that such time preceding death may be a benefit in some ways. *Cf.* Leebron, *supra* note 1, at 285 ("One could argue that extremely brief periods of contemplation . . . produce nothing but terror, whereas longer periods of contemplation are a relative benefit."); Cass R. Sunstein, *Bad Deaths*, 14 J. Risk & Uncertainty 259, 269 (1997) (suggesting that opportunity to plan for death can be beneficial).

49. *See* SAB 2000 Review, *supra* note 47, at 5.

50. Revesz, *Environmental Regulation*, *supra* note 35, at 941. The changes in an individual's income over her lifetime and differences in income among occupations may also lead to undervaluing mortality risk, *see id.* at 962–68, but this distinction falls outside the scope of this Note and is part of the broader conversation regarding individuation of VSL.

51. *Id.* at 941.

52. EPA Guidelines For Preparing Economic Analyses, *supra* note 38, at B-2 tbl. B.1.

53. *Id.*

54. The EPA's own advisory environmental economists acknowledged this fact more broadly in 2000: "[U]nder some circumstances, the valuations of life obtained from studies of risks of instantaneous deaths in workplace accidents will not

Though wage-risk studies are preferred for computing generic VSL figures, four obstacles stand in the way of wage-risk studies accounting for latent harms. First, wage-risk studies are, by their very nature, incapable of capturing the full value of latent harms. Such studies derive willingness to pay from wage compensation for riskier jobs by cross-referencing occupational mortality statistics with wage data.[55] Therefore, due to the focus of such studies on the workplace, they examine "almost exclusively . . . industrial accidents," which do not account for latent harms.[56] Because the only harm contemplated is immediate death, the implicit valuation wage-risk interactions take no account of any characteristics of latent harms. This inability to account for latent harms casts doubt on the wisdom of using traditional VSL calculation methods to determine a VSL for cancer.

Second, even if wage-risk studies were able to account for latent harms, there is a relative lack of industrial statistics on deaths resulting from latent harms, which prevents regulators from accurately counting the numbers of such harms.[57] In contrast, regulators could easily tally the number of employees killed instantly by electrocution or heavy machinery mishaps, as the relationship between risk and result is immediate and observable.[58] It can be diffi-

provide meaningful measures of the benefits of environmental regulation." SAB 2000 REVIEW, *supra* note 47, at 17. However, the Committee also notes "[t]his is likewise true of some non-carcinogenic environmental harms." *Id.* More specifically, they found that VSLs calculated using "wage-risk tradeoff studies should not be taken as accurate estimates of the value of reducing the risk of fatal cancers because of differences in both the nature of the risks being valued and in the socio-economic characteristics of the affected populations." *Id.* at 18–19.

55. Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1437. In response to concern that certain "safer" jobs (lawyer, banker, etc.) may be more lucrative than less safe jobs (firefighter, miner, etc.), these studies control to isolate marginal compensation for risk. *See* W. Kip Viscusi, *The Value of Risks to Life and Health*, 31 J. ECON. LITERATURE 1912, 1917 (1993). Overall, as John Stuart Mill observed, the best jobs in society will tend to be the highest paid. However, this does not imply that there are no compensating differentials for any particular position, only that there is a broader societal wealth effect at work that will make it difficult to disentangle the wage-risk tradeoff that is present. Use of individual level data that includes measures of worker education, experience, and other productivity-related variables isolates the additional compensation workers of a given productivity will receive for jobs posing greater risk. *Id.*

56. Revesz, *Environmental Regulation*, *supra* note 35, at 955–56.

57. *Id.*, at 956.

58. Different types of cancers are associated with latency periods of different lengths. *See, e.g.*, JOHN HOWARD, WORLD TRADE CENTER HEALTH PROGRAM, MINIMUM LATENCY & TYPES OR CATEGORIES OF CANCER, (May 1, 2013), http://www.cdc.gov/wtc/pdfs/wtchpminlatcancer2013-05-01.pdf [https://perma.cc/SY5L-TPTY]

cult if not impossible to discern when an employee's death from cancer should be attributed to a workplace exposure if she is exposed to carcinogens outside of her job or to other chronic diseases present during the period of morbidity. Finally, latent conditions are harder to tally because they occur well after the event of exposure. In the intervening time, workers scatter through retirement, job or industry switching, termination, or other events. Thus, no mechanism follows the workers long enough to capture their conditions.

A third issue is the difficulty individuals face in valuing harms that they could potentially experience in the future. There are cognitive barriers to accurately gauging and weighing risks of future harm, and these barriers hinder subjects from meaningfully determining their willingness to pay.[59] Generally, "some commentators doubt that our cognitive capacities are sufficiently developed to perform such valuations in the case of future harms."[60] Indeed, the human brain is notoriously bad at assessing risk, be it grappling with low-probability events or contemplating risks that evoke emotional responses.[61] This problem is endemic not only to wage-risk studies, but also to contingent valuation studies. Unfortunately, no speedy fix is forthcoming, as the problem is hardwired into the human brain.

The fourth inherent limitation of wage-risk studies for measuring cancerous mortality risk is that they are not able to determine whether exposure to a toxin or some other variable caused the cancer. Studying the development of cancer entails accepting the highly individualized potential for "synergistic interactions" between workplace risks of latent harms and outside risks.[62] There are practical issues of tracking exposed individuals and establishing causality between a carcinogenic exposure and a particular can-

(announcing minimum latency periods for use in the World Trade Center Health Program ranging from 0.4 years for "[l]ymphoproliferative and hematopoietic cancers" to 11 years for mesothelioma).

59. Revesz, *Environmental Regulation*, *supra* note 35, at 957; *see* Christine R. Harris, et al., *Gender Differences in Risk Assessment: Why Do Women Take Fewer Risks than Men?*, 1 JUDGMENT & DECISION MAKING 48 (2006); BUREAU OF LABOR STATISTICS, FATAL OCCUPATIONAL INJURIES IN 2013 8 (2015), http://www.bls.gov/iif/oshwc/cfoi/cfch0012.pdf [https://perma.cc/ND8V-T4ZV] ("A disproportionate share of fatal work injuries involve men relative to their hours worked in 2013.").

60. Revesz, *Environmental Regulation*, *supra* note 35, at 957 (citing Maureen L. Cropper & Frances G. Sussman, *Valuing Future Risks to Life*, 19 J. ENVTL. ECON. & MGMT. 160, 166 n.8 (1990) (noting that it is difficult for individuals "to distinguish between risks occurring 10 versus 30 years into the future.")).

61. *See* Szalavitz, *supra* note 33.

62. Revesz, *Environmental Regulation*, supra note 35, at 957.

cer.[63] In short, if an employee is exposed to a carcinogen while working as a rubber manufacturer and develops cancer some years later, it is anybody's guess if that cancer is the product of his employment, or of the individual's penchant for smoking tobacco, drinking alcohol, or eating processed meats (or perhaps some combination thereof).[64] This uncertainty undermines the value of wage-risk studies and makes them ill-suited to assessing risk preferences for latent harms.

If wage-risk studies are the foundation of a VSL calculation but cannot adequately account for such latent harms, the EPA should embrace alternative means of accounting for cancerous risk. Contingent valuation studies can and must pick up the slack. Though disfavored compared to wage-risk studies, contingent valuation studies are reputable and offer a next-best solution for assessing preferences around latent harm risk reduction. This compromise is necessary because of the shortcomings of wage-risk studies pertaining to latent harms. These studies allow for the creation and adoption of a cancer differential without relying on a methodology that has proven a poor fit for this purpose. Unfortunately, the EPA has yet to embrace a cancer differential. Part II will illustrate why the Agency, despite having entertained the idea of adopting such a multiplier, has yet to do so.

II.
THE EPA'S INACTION AND THE PROMISE OF AN INTERIM VALUE

Part II begins by examining the history of the concept of a "cancer differential," a multiplier that could change VSL to account for the difference between generic and cancerous mortality risk. It continues by tracing the trajectory of the differential at the EPA from the moment it first considered adopting one to its announcement of a specific interim estimate,[65] which the EPA's Science Advisory Board (SAB)[66] rejected on questionable grounds. A 2016 EPA

63. *Id.*

64. *Known and Probable Human Carcinogens*, AMERICAN CANCER SOCIETY, http://www.cancer.org/cancer/cancercauses/othercarcinogens/generalinformationaboutcarcinogens/known-and-probable-human-carcinogens [https://perma.cc/UK73-X6NA].

65. This estimate is a routine part of the process of ultimately producing a final figure.

66. The SAB is a public advisory committee within the EPA that provides scientific and technical advice during the production of EPA reports or regulations. *See* U.S. ENVTL. PROT. AGENCY SCI. ADVISORY BD., EPA-SAB-11-011, REVIEW OF VALUING MORTALITY RISK REDUCTIONS FOR ENVIRONMENTAL POLICY: A WHITE PAPER

White Paper and its review by the SAB provided a renewed occasion for the adoption of a cancer differential, but the SAB has once again rejected the reform.[67]

A. The EPA's First Attempt

Evidence showing that cancerous deaths should be valued distinctly from other harms has existed for decades. Scientific studies supporting this proposition emerged in the mid-1980s and early 1990s.[68] Subsequent to this early literature, legal scholars began advocating for an approach to quantifying the value of life in cost-benefit analysis that specifically accounted for latent harms, including cancer differentials.[69] For example, writing in 1999, Revesz advocated for increasing the VSL for risks caused by environmental carcinogens.[70] He suspected that the lack of such corrections for latent harms might have led to the significant undervaluation of lives and thus suboptimal protection of public health.[71] Similarly, writing in 2004, Professor Cass Sunstein argued that "the government's current valuation of cancer risks is probably too low, resulting in widespread underprotection of the public."[72] However, it is important to note that these claims stem from different theoretical outlooks. Whereas Revesz wrote to specifically advance the debate around valuing latent harms in the regulatory state (particularly in the environmental context),[73] Sunstein's contention is intertwined with a much broader thesis that "question[s] the consensus in favor of a uniform VSL" and argues for the individuation of VSL across different types of risks and individuals.[74]

In the administrative domain, the EPA has previously entertained the proposition that cancer should be valued differently. In

(2011) [hereinafter SAB 2011 REVIEW]. SAB is also designed "to provide balanced, expert assessment of scientific matters related to problems facing the agency." *Id.*

67. SAB 2017 Review, *supra* note 7, at 49–52.

68. M.W. Jones-Lee et al., *The Value of Safety: Results of a National Sample Survey*, 95 THE ECON. J. 49 (1985); Ian Savage, *An Empirical Investigation into the Effect of Psychological Perceptions on the Willingness-to-Pay to Reduce Risk*, 6 J. RISK & UNCERTAINTY 75 (1993). However, the SAB criticized the methodology of both efforts. *See* SAB 2011 REVIEW, supra note 66, at 6.

69. *See* 2010 EPA WHITE PAPER, *supra* note 31, at 21.

70. Revesz, *Environmental Regulation*, *supra* note 35, at 947.

71. *Id.*

72. Cass R. Sunstein, *Valuing Life: A Plea for Disaggregation*, 54 DUKE L.J. 385, 393 (2004).

73. Revesz, *Environmental Regulation*, *supra* note 35, at 948 ("A central goal of this Article is to move the regulatory process towards a more thoughtful valuation of human lives threatened by environmental carcinogens . . . .").

74. Sunstein, *supra* note 72, at 389–90.

a 1999 proposed rule regarding radon isotopes in drinking water, the EPA had asked the SAB to review how to value the avoidance of cancer fatalities, including whether the Agency should adopt a cancer differential. The EPA defined the differential as "the additional value or sum that people may be willing to pay to avoid the experiences of dread, pain and suffering, and diminished quality of life associated with cancer-related illness and ultimate fatality."[75] Then, in a 2000 White Paper, the EPA again broached the possibility of implementing a cancer differential.[76] These proposals came at a time when no other agency had yet considered one.[77]

The EEAC was charged with assessing the question of whether a statistical value should be adopted specifically for cancer fatalities.[78] After examining certain "risk characteristics" pertinent to cancer fatalities—"(1) timing, (2) morbidity, fear and dread, (3) voluntariness and controllability, and (4) the public nature of the risk reduction"—almost all of the committee members agreed that "on the basis of the current literature, the only risk characteristic for which adjustments to the VSL can be made is the timing of the risk."[79] Hence, the EEAC refused to support a cancer differential.[80] While the Committee noted that "cancer victims typically suffer greater morbidity, fear, or dread than the victims of the causes of

75. National Primary Drinking Water Regulations; Radon-222; Proposed Rule 64 Fed. Reg. 59,246, 59,326 (proposed Nov. 2, 1999). The rule was not adopted, though the EPA later returned to the topic. *See* OFFICE OF WATER, ENVTL. PROT. AGENCY, EPA 815-R-12-002, REPORT TO CONGRESS: RADON IN DRINKING WATER REGULATIONS (2012).

76. *See* SAB 2000 REVIEW, *supra* note 47. The specific committee that drafted the White Paper was the Environmental Economics Advisory Committee (EEAC). The EEAC is sub-committee of experts within the SAB, which focuses on the use of "science and research to assess public benefits and costs of the EPA's environmental programs." *Environmental Economics Advisory Committee*, U.S. ENVTL. PROT. AGENCY, http://yosemite.epa.gov/sab/sabpeople.nsf/WebCommitteesSubcommittees/Environmental%20Economics%20Advisory%20Committee [https://perma.cc/YL3R-654D]. The EEAC provides the EPA with feedback on its mortality quantification methodologies, which the Agency includes in updated versions of its Guidelines for Preparing Economic Analysis, the EPA's definitive text for regulatory analysis. *See Valuing Mortality Risk Reductions for Policy: Proposed Updates to Valuation and Income Elasticity Estimates*, ENVTL. PROT. AGENCY, http://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/0ca9e925c9a702f285257f380050c842!OpenDocument [https://perma.cc/U2TV-8ZBZ].

77. SAB 2000 REVIEW, *supra* note 47, at 4. It is intuitive that the EPA would be a thought leader on this issue due to the EPA's preeminence in economic analysis among the health and safety agencies. *See* Livermore, *supra* note 9.

78. SAB 2000 REVIEW, *supra* note 47, at 3–4.

79. *Id.* at 5.

80. *Id.*

death involved in VSL studies,"[81] it concluded that there was insufficient reliable data to assess the value of a cancer premium.[82] Distilled to a phrase, the EEAC's verdict on a cancer differential was that it was "theoretically valid but empirically ambiguous."[83]

Ten years after this tentative statement on cancerous harms, the EPA's National Center for Environmental Economics (NCEE), which assists the Agency in determining the economic impact of proposed regulations, published a 2010 White Paper, that, for the first time in the EPA's history, made a specific quantified recommendation for a cancer differential that could be used to produce a more accurate VSL.[84] In the paper, the NCEE defined a "cancer differential" as "capturing elements of dread and fear of cancer, as well as the pain and suffering from the period of illness preceding death" and also, perhaps, entailing "income and household productivity losses over this period of morbidity."[85]

In the 2010 White Paper, the EPA performed a literature review to develop more concrete guidance, noting that the literature regarding cancer premiums had "developed considerably" since the 2000 White Paper was published.[86] The EPA concluded that it should synthesize the results of the literature surveyed into a single number. In that vein, the NCEE averaged the differentials dictated by nine studies[87] and came to a figure of 52%, a first-cut premium by which the VSL would be increased for risks of cancerous death.[88]

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81. *Id.* at 5–6.

82. *Id.*

83. 2010 EPA WHITE PAPER, *supra* note 31, at 9.

84. *Id.* at 20–21.

85. *Id.*

86. *Id.* at 5, 21.

87. *See* 2010 EPA WHITE PAPER, *supra* note 31, at 25 n.14 (citing Wiktor Adamowiz et al., *Valuation of Cancer and Microbial Disease Risk Reductions in Municipal Drinking Water: An Analysis of Risk Context Using Multiple Valuation Methods*, 61 J. EVNTL. ECON. & MGMT. 213 (2010); Trudy Ann Cameron & J.R. DeShazo, *Demand for Health Risk Reductions*, 65 J. EVNTL. ECON. & MGMT 87 (2013); James K. Hammitt & Kevin Haninger, *Valuing Fatal Risks to Children and Adults: Effects of Disease, Latency, and Risk Aversion*, 410 J. RISK & UNCERTAINTY 57 (2010); James K. Hammitt & Jin-Tan Liu, *Effects of Disease Type and Latency on the Value of Mortality Risk*, 28 J. RISK & UNCERTAINTY 73 (2004); Wesley A. Magat et al., *A Reference Lottery Metric for Valuing Health*, 42 MGMT. SCI. 1118 (1996); Takahiro Tsuge et al., *A Choice Experiment Approach to the Valuation of Mortality*, 31 J. RISK & UNCERTAINTY 73 (2005); George Van Houtven et al., *Cancer Premiums and Latency Effects: A Risk Tradeoff Approach for Valuing Reductions in Fatal Cancer Risks*, 36 J. RISK & UNCERTAINTY 179 (2008); Anna Alberini & Milan Scasny, *Labels and Perceptions in Mortality Risk Reduction Valuations* (working paper 2010); Anna Alberini & Milan Scasny, *Context and the VSL: Evidence from a Stated Preference Study in Italy and the Czech Republic* (working paper 2010)).

88. 2010 EPA WHITE PAPER, *supra* note 31, at 25.

Acknowledging the calculation was "a preliminary estimate and should be refined or replaced with a more systematic synthesis of the literature," the EPA advocated for a temporary differential of 50% for regulatory analyses until a more refined estimate could be produced.[89]

As was the case in 2000, the 2010 EPA White Paper went to the SAB's EEAC, which recruited outside experts to review the document in December 2010.[90] The Committee held a conference where they agreed evidence indicated that a cancer differential should be adopted but debated whether a 50% premium was excessive and if that differential conflated the valuations of morbidity and mortality.[91] Ultimately, the EEAC's members endorsed the advice that the EPA should sharpen its estimate before putting it into place. However, no refined estimate has been forthcoming or implemented in subsequent years.[92]

While the EEAC agreed that "values for risk reductions are not 'one size fits all'" and backed the EPA's approach of applying distinct values depending on risk characteristics,[93] the Committee found there was not enough evidence to support the Agency's adoption of a cancer differential.[94] First, the SAB pointed out a transcription error the EPA committed in calculating their estimate.[95] Next, the SAB objected to the lack of control provided for the variation in the types of cancer and nature of risks in the studies

89. *Id.* at 26. The White Paper does not explain the shift from 52% to 50% except noting that the latter "might be a reasonable placeholder value for use in upcoming [regulatory impact analyses]." *Id.*

90. *See* SAB 2011 REVIEW, *supra* note 66, at 1; Letter from Lisa P. Jackson, Administrator, U.S. Environmental Protection Agency, to Deborah L. Swackhamer, Chair, Science Advisory Board, and Catherine L. Kling, Chair, Environmental Economics Advisory Committee, (Oct. 14, 2011), https://yosemite.epa.gov/sab/sabproduct.nsf/c91996cd39a82f6485257424006901 27/298E1F50F844BC23852578DC0059A616/$File/EPA-SAB-11-011_Response_10-14-2011.pdf [https://perma.cc/9RLH-WAF2].

91. *See* SAB 2011 REVIEW, *supra* note 66, at 1; Science Advisory Board Staff Office, Notification of a Public Meeting of the Environmental Economics Advisory Committee Augmented for Valuing Mortality Risk Reductions, 75 Fed. Reg. 80,048 (Dec. 21, 2010).

92. *See* Summary Minutes of the U.S. Environmental Protection Agency Science Advisory Board (SAB) Environmental Economics Advisory Committee (EEAC) Augmented for Valuing Mortality Risk Reduction Public Teleconference (Mar. 14, 2011), https://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCal/613CFA8C1465C1B5852578340068AC59/$File/3-14-11+EEAC-VMR+Minutes.pdf [https://perma.cc/GE6F-XV6U]; SAB 2011 REVIEW, *supra* note 66, at 1.

93. SAB 2011 REVIEW, *supra* note 66.

94. *Id.* at 2.

95. *Id.* at 12.

the EPA relied upon to create a cancer differential.[96] Finally, the EEAC expressed concern about differences between observed cancer differentials among studies with diverse risk characteristics, including variations in morbidity or latency periods between carcinogen exposure and the development of symptoms.[97]

Although rejecting the implementation of a cancer differential, the EEAC argued in favor of a future "integrated process used to estimate the value of mortality risk reduction and how it varies with risk and individual characteristics."[98] Essentially, the EEAC proposed to lump a potential cancer differential in with the behemoth set of questions about how VSL should change across populations and risks, to be addressed at some future date. This process is a mechanism to achieve the conceptual end of individuation that Sunstein advocates, which is explained and critiqued in Part III.C of this Note. As for the cancer differential, the EPA followed the EEAC's recommendations and has since failed to adopt such a figure.[99]

B. The SAB's Concerns in Detail and Criticism of Its Decision

Forging a path for a viable cancer differential requires an analysis of why the EPA has yet to adopt one in its regulatory analysis. As such, it is important to scrutinize the justifications the EEAC presented for rejecting the EPA's proposed cancer differential before implementation. The EEAC's objections are surmountable and so should not have prohibited an interim ratio.

The EEAC's simplest objection is an arithmetic error that occurred during an averaging of multiple studies.[100] In order to calculate the initial cancer differential estimate, the EPA compared the average VSL for cancerous deaths derived from nine stated preference studies to the VSL for non-cancerous deaths, yielding a single differential.[101] As the EEAC pointed out, the EPA calculation misstated the differential drawn from one study: Van Houtven et al.[102] Whereas the study found a differential of two, the EPA had calcu-

96. *Id.*

97. *Id.*

98. *Id.*

99. *See* Letter from Lisa P. Jackson to Deborah L. Swackhamer, *supra* note 90.

100. SAB 2011 REVIEW, *supra* note 66, at 12. For the nine studies averaged, see *supra* note 87.

101. 2010 EPA WHITE PAPER, *supra* note 31, at 25 & n.14, 74–77 tbl.1.

102. SAB 2011 REVIEW, *supra* note 66, at 12; *see* Van Houtven et al., *supra* note 87.

lated its average using a Van Houtven differential of three.[103] Fixing the Van Houtven differential yields an interim estimate of 41% rather than 52% as the EPA originally calculated.[104] Ultimately, fixing the arithmetic would yield a difference of only 9% from the proffered 50% rounded estimate, perhaps less depending on future studies. While 9% of VSL represents a significant amount of money per death avoided, that figure is minor compared to that of a cancer differential of four or five times that.

The EEAC's second objection is that the studies were not controlled for evaluating different types of cancer and for comparing the risks of developing those cancers to various types of risks not covered by the other studies.[105] The nine studies covered generic fatal cancer, which does not specify the afflicted area or organ or identify specific cancers such as those of the lung, stomach, liver, and brain.[106] They also compared risk of cancer to other fatality risks, including respiratory ailments, auto accidents, microbial illnesses, heart attacks, and strokes, among others.[107]

However, there is no reason these variations should justify turning down a cancer differential. After all, the studies that form the very basis for the EPA's generic central VSL calculate different types of risks.[108] Surely the EPA's sophisticated internal economics capacity will engineer a long-term solution. In the meantime, an interim value could be instituted: (1) without regard to the variation among different cancers; (2) with a rudimentary weighting of the value of the different cancers as dictated by incidence in the general population, such that preferences tied to a specific type of cancer will only be included to the extent that the cancer propor-

103. Van Houtven et al., *supra* note 87; SAB 2011 REVIEW, *supra* note 66, at 12.; 2010 EPA WHITE PAPER, *supra* note 31, at 25 n.14.

104. Values attributed to studies, *supra* note 87, with summary point estimates taken from 2010 EPA WHITE PAPER, *supra* note 31, at 25 n.14, with the Van Houtven error corrected: 0 (Hammit & Haninger); 0.5 (Alberini & Scansy, *Labels and Perceptions in Mortality Risk Reduction Valuations*); .85 (Alberini & Scansy, *Context and the VSL: Evidence from a Stated Preference Study in Italy and the Czech Republic*); -0.15 (Adamowiz et al.); 0 (Cameron & Deshazo); 0.2 (Tsuge et al.); 0.3 (Hammitt & Liu); 2 (Van Houtven et al.); 0 (Magat et al.).

105. *Id.*

106. 2010 EPA WHITE PAPER, *supra* note 31, at 74–77 tbl.1.

107. *Id.*

108. *Compare* Thomas J. Knieser & John D. Leeth *Compensating Wage Differentials for Fatal Injury Risk in Australia, Japan, and the United States*, 4 J. OF RISK & UNCERTAINTY 75 (1991) (examining valuation of fatality risk in the manufacturing sector), *with* A.T. de Blaeij et al., *The Value of Statistical Life in Road Safety: A Meta-Analysis*, 35 ACCIDENT ANALYSIS & PREVENTION 973 (2003) (performing a meta-analysis of studies of fatality risk in road safety).

tionally appears in the population; or (3) with weighting as dictated by the carcinogenic risk profile of the particular regulated substance at issue, which would take into account the various health and other outcomes associated with different cancer types. The first solution is different from the latter two options in that it sidesteps the issue of variations among types of cancer. The second solution would adjust the value of a differential to reflect how prevalent different cancers are in society, and the third solution would consider the types of cancers that a proposed regulation might prevent and adjust accordingly. Regardless, the existence of slightly different types of evidence with different magnitudes is no reason to sidestep such evidence, particularly when it points in the same direction.

The EEAC's final concern is that a cancer differential cannot accurately account for the variations in each person's "illness profile," such as latency in developing the disease or morbidity.[109] This objection is related to the lack of control for various types of cancers, but there is a subtle distinction. If comparing different cancers to different risks is a matter of comparing apples and oranges, the worry with disparate illness profiles is tantamount to examining apples of different shapes, sizes, and types. Perhaps cancer of one organ has a brief latency period but favorable prognosis, whereas cancer of another organ takes decades to develop and is more often fatal. Such concerns are evident in the studies, which draw conclusions based on various latency periods, thus introducing timing—that is, the temporal gap between exposure to a risk and death—as a variable risk characteristic.[110] While attention to this inconsistency is certainly warranted because in the long term some standardization is necessary, it should not have been prohibitive, since for an immediate value that process can be skipped or performed in a rudimentary fashion.

For the above reasons, the EEAC offered an alternative to the cancer differential—an "integrated process" to account for various demographic and risk characteristics in one holistic inquiry.[111] Rather than single out cancer fatalities, their proposed approach seeks to map preferences across a wider range of variables all at once in the service of more accurately reflecting the public's prefer-

109. SAB 2011 REVIEW, s*upra* note 66, at 12.

110. 2010 EPA WHITE PAPER, *supra* note 31, at 74–77 tbl.1; *see, e.g.*, Alberini & Scasny, *supra* note 17 (using latency periods of 0, 2, 5, and 10 years); James K. Hammitt & Jin-Tan Liu, *supra* note 87 (using a latency period of 20 years).

111. SAB 2011 REVIEW, *supra* note 66, at 12. This is more akin to the Sunstein approach discussed and critiqued in Part III.C as it reflects more granular, cross-sectioned preferences.

ences. This misguided approach, discussed in Part III.C, presents no barrier to a cancer differential, but rather a more extensive, complicated alternative. Though some issues do exist with the EPA's first estimate of a 50% differential, these issues should not have precluded the use of an estimate in the intervening six years since that figure was suggested.

C. A Second Chance Squandered

On April 27, 2015, the EPA announced that it was seeking nominations for experts to serve on the next iteration of the EEAC.[112] Four members of the resulting group, including the chair, overlap with the scholars who reviewed the EPA's 2010 White Paper.[113] The Committee also includes certain individuals, like Van Houtven, who authored some of the studies the EPA and NCEE have referenced and used for support in White Papers and other research and publications.[114]

In February 2016, the EPA's Office of Policy published a White Paper focused on valuing mortality risk.[115] The report catalogs the EPA's "application and implementation of recent SAB recommendations" around updating VSL figures and practices, including tracing previous EPA positions regarding latent harms.[116] The draft is focused on renewing the generic VSL estimate to account for new studies and introducing that literature into the EPA's meta-analysis database for discerning a primary VSL figure.[117]

Along with the publication of the new White Paper, the EPA provided the EEAC with questions to focus its review.[118] Of the sev-

112. Request for Nominations of Candidates to the EPA's Science Advisory Board (SAB), 80 Fed. Reg. 23,270 (Apr. 27, 2015).

113. Those returning members are Dr. F. Reed Johnson, Dr. Madhu Khanna (chair), Dr. JunJie Wu, and Dr. Jinhua Zhao. *See* SAB 2011 Review, *supra* note 66, at ii; U.S. ENVTL. PROT. AGENCY, *supra* note 76.

114. *See* U.S. ENVTL. PROT. AGENCY, supra note 76.

115. 2016 EPA WHITE PAPER, *supra* note 18.

116. *Id.* at 1, 5.

117. *Id.* at 34, 36 (proposing a new "central estimate of the average VSL" for the adult American population of $10.3 million in 2013 dollars).

118. *Charge Questions for SAB-EEAC Review of an EPA White Paper: "Valuing Mortality Risk for Environmental Policy: A Meta-Analytical Approach" and Technical Memorandum: "Income Elasticity of VSL"* (Feb. 2016), http://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/0CA9E925C9A702F285257F380050C842/$File/Charge_EEAC_March+7_8_final.pdf [https://perma.cc/U7LV-A2XL].

enteen charges the EPA put forth, one specifically addresses a cancer differential.[119] The EPA mentions the three cancer risk reduction studies it included in its recalculation of VSL and suggests that the EPA "could augment the literature by modifying the selection criteria to include studies from other countries or from the grey literature [i.e., studies produced by certain outside sources], and/or using other methods (e.g., risk-risk studies)."[120] Most importantly, the EPA asks two specific questions of the EEAC reviewers: the first is "whether, and if so how, selection criteria for identifying studies for estimating a cancer differential should differ from those used in the [2016] White Paper?"; the second is whether the literature supports the adoption of a cancer differential.[121]

The EPA's charge with respect to a cancer differential was a tremendous opportunity to finally implement a measure, but the EEAC again chose to reject that path. The renewed EEAC met March 7–8, 2016 in Arlington, Virginia.[122] With the cancer differential receiving relatively little attention during the two-day meeting, the EEAC preliminarily agreed to recommend forgoing a differential yet again for lack of sufficient evidence.[123] The Committee's discussion also displayed concerns that adopting a cancer differential could open the floodgates to more individuated tailoring of

119. *Id.* at 2. ("Please comment on whether, and if so how, selection criteria for identifying studies for estimating a cancer differential should differ from those used in the White Paper. Does the literature support a non-zero cancer differential?").

120. *Id.* at 3.

121. *Id.*

122. Notification of a Public Meeting of the Science Advisory Board Environmental Economics Advisory Committee, 81 Fed. Reg. 4,296 (Jan. 26, 2016).

123. I attended the EEAC meeting in Arlington, Virginia. Meeting notes and other pertinent materials are available through the Committee's website at https://yosemite.epa.gov/sab/SABPRODUCT.NSF/81e39f4c09954fcb85256ead006be86e/0ca9e925c9a702f285257f380050c842!OpenDocument [https://perma.cc/7PSJ-QPEX]. Despite the adoption of a differential, one innovative potential approach was mentioned in passing—borrowing from the FDA's embrace of a "patient-centered perspective" through a "structured benefit-risk framework." *See* DEP'T OF HEALTH & HUMAN SERVS. FOOD & DRUG ADMIN. ET AL., GUIDANCE FOR INDUSTRY AND FOOD AND DRUG ADMINISTRATION STAFF: FACTORS TO CONSIDER WHEN MAKING BENEFIT-RISK DETERMINATIONS IN MEDICAL DEVICE PREMARKET APPROVAL AND DE NOVO CLASSIFICATIONS (2016), http://www.fda.gov/ucm/groups/fdagov-public/@fdagov-meddev-gen/documents/document/ucm517504.pdf [https://perma.cc/BE3E-JQW7]; Nina L. Hunter & Robert M. Califf, *FDA's Patient Preference Initiative: The Need for Evolving Tools and Policies*, FDA VOICE (Sept. 25, 2015), http://blogs.fda.gov/fdavoice/index.php/2015/09/fdas-patient-preference-initiative-the-need-for-evolving-tools-and-policies/ [https://perma.cc/5QYU-LM77].

VSL measures in other EPA matters.[124]

The Committee's written report does offer some affirming insight into the conceptual grounding behind a cancer differential:

> The motivation behind a potential cancer differential is that a death from cancer is preceded by a significant period of morbidity. Cancer treatment typically is accompanied by surgery, chemotherapy, and radiation that can have serious debilitating side effects. The experience of death is also traumatic for family and friends as well as the affected individual in ways that sudden death is not. According to this motivation, a cancer death can be thought of as two events, a period of morbidity followed by an early death. Logically, a death preceded by a significant period of morbidity would be viewed as worse than a sudden accidental death (though there may be some benefit to being given a period of time to put one's affairs in order). Indeed, Gentry and Viscusi (2016), using revealed preference wage data, find that wage premiums for occupational mortality risks that tend to be preceded by longer periods of morbidity are higher than premiums for occupational mortality risks that tend to be preceded by shorter periods of morbidity, and that the value of a statistical life can be decomposed into a value of the fatality risk plus a value of the associated morbidity risk. These studies show that people value both mortality risks and associated morbidity risks, suggesting that a cancer premium could exist.[125]

Further, they also note that because "people associate a higher level of dread with cancer risks than with other health risks" there may be an additional motivation for a differential.[126]

Despite confirming the conceptual basis for a differential, the Committee ultimately found that "there is not sufficient evidence at this time to justify a non-zero cancer differential."[127] Further, "[u]ntil new evidence becomes available to allow identification of a specific cancer differential, the SAB recommends that the EPA continue its current practice of using the same VSL to value cancer mortality and other mortality causes."[128] Beyond the lack of evidence, the Committee also voiced concern about the variation in

124. As discussed in Part III.C, this option presents a different proposition entirely and could allow for disturbing normative outcomes such as severe stratification of regulatory policy by class, race, gender, or age.

125. SAB 2017 REVIEW, *supra* note 7, at 50.

126. *Id.* at 50 n.7.

127. *Id.* at 8.

128. *Id.*

morbidity periods across different types of cancers and the exclusion of other latent harms such as chronic obstructive pulmonary disease (COPD) or heart disease.[129] Finally, the Committee took issue with the fact that studies that yield VSL estimates for cancerous deaths do not explicitly include morbidity and thus "are not really 'pure'" reflections of how individuals value avoiding risks of cancerous death.[130] While this may be true, surely the explicit inclusion of morbidity in such a study would yield higher willingness to pay to avoid the event, assuming that people would pay more to avoid the chance of a period of protracted suffering followed by death than a chance of death alone.

In declining to recommend a cancer differential (though noting that one may indeed exist), the Committee highlighted a central paradox in the way the EPA treats cancer for cost-benefit analysis.[131] While the Agency uses the same VSL for cancer mortality risks as all other risks, the Agency only values morbidity in cases of non-fatal cancer.[132] The implication is that while non-cancerous fatalities and cancerous non-fatalities are both given their full worth, cancerous fatalities are undervalued. A cancer differential would remedy this inconsistency, but the details of where to set that differential continue to get in the way of instituting it in the first place. Given that so many years have elapsed since the EPA's original suggestion of such a differential, this delay is unacceptable. It would seem that same refrain from 2010 foreshadowed the continuing fate of a differential: "theoretically valid but empirically ambiguous."[133]

III.
SUPPORT FOR A DIFFERENTIAL AT HOME AND ABROAD

Part III advocates for the use of an interim differential by the EPA in future rulemakings. Instituting a cancer differential is an easily implemented reform that is supported by evidence and normatively intuitive.[134] Highly technical quibbles should not be a bar

129. *Id.* at 51.
130. *Id.*
131. SAB 2017 Review, *supra* note 7, at 9.
132. *Id.*
133. 2010 EPA White Paper, *supra* note 31, at 9.
134. *See, e.g.*, Alberini & Scasny, *Labels and Perceptions in Mortality Risk Reduction Valuations*, *supra* note 17; Alberini & Scasny, *Context and the VSL*, *supra* note 17; McDonald et al., *supra* note 17; Van Houtven et al., *Cancer Premiums and Latency Effects*, *supra* note 17.

to progress, especially as regulatory techniques abound which account for evolving methodologies that require further refinement. Supporting the immediate implementation of a differential are the examples of the European Commission and United Kingdom. In addition, the domestic example of EPA's adoption of the Social Cost of Carbon (SCC) provides a strong precedent for the institution of imperfect measures that later necessitate improvement. Part III.C describes the normative shortcomings, logical inconsistencies, and practical impediments associated with the drive towards individuation of VSL. Finally, this Note concludes with discussion of the importance of continued and targeted government-driven research of how individuals value reductions in mortality risk.

A. Toward a Temporary Differential

Fatal cancer risks have been needlessly undervalued for years despite the existence of compelling empirical data and arguments from scholars which demonstrate that people place greater value on avoiding risks of cancerous death than other fatal risks. Even when the EPA's NCEE explicitly proposed rectifying this omission, the EEAC of the SAB declined to implement the recommended 50% estimate for a cancer differential. Some five years later the EEAC was asked once more to respond to an inquiry of whether the literature supports a cancer differential. The EEAC again chose to not recommend one. Despite these missed opportunities, the EPA should institute a positive cancer differential; today this differential can take the form of a temporary, rough estimate to be refined at some future date based on additional data and analysis. Even a somewhat imprecise differential would ensure that the EPA stops completely undervaluing cancerous fatalities, which in turn will save lives through the aversion of untimely deaths.[135]

The EPA is stuck in a paradox regarding establishing a cancer differential: the EPA claims to have insufficient data that would support the adoption of a differential while simultaneously tightening standards for studies which produce such data. Indeed, the EPA and the EEAC in its advisory capacity have constricted the once large[136] potential pool of studies of cancer mortality valuation by requiring, for example, that all studies used in creating EPA figures be conducted in the United States, published in English, and

135. This Note declines to put forth a specific differential, instead deferring to those with expertise in environmental economics. However, updating the 50% estimate to account for more recent studies could quickly yield an estimate.

136. The empirical literature on cancer is only outmatched by that on fatality. *See* 2011 SAB REVIEW, *supra* note 66, at 12.

placed in peer-reviewed journals.[137] At the same time, the EEAC has pushed back against a cancer differential, citing insufficient evidence.[138] Because the EPA and EEAC now rely on a narrower range of studies, they have lost sight of a consistent, decades-long stream of evidence that people are willing to pay more to reduce cancerous fatality risk than generic risk. Compounding this problem is that the structural shortcomings of the methodology—wage-risk studies—that the EPA typically uses to value mortality risk render the Agency incapable of accurately gauging latent harms.[139]

A temporary cancer differential should be adopted as soon as possible, despite the EEAC's recent rejection of this path.[140] Any such differential would by no means be perfect. It may even be in the form of a range to account for the EEAC's earlier criticisms regarding the presence in the literature of different specific cancers and unstandardized risk characteristics like individual latency periods. However, even a broad or uncertain differential would still allow the heightened value of cancer mortality risk reduction to play a role in EPA rulemaking. In fact, the executive branch's guidance to agencies regarding regulatory analysis provides for situations when precise quantification is not possible. The Office of Management and Budget advocates "breakeven analysis," which would apply equally well to the outcomes that a range of differentials would dictate—a set that would necessarily have a fixed minimum and maximum based on the lowest and highest values in the range.[141] Breakeven analysis requires an agency to ask how large a benefit

137. *See* 2016 EPA WHITE PAPER, *supra* note 18, at 6–7. This tightening is the result of stringent design requirements for studies that provide the basis for estimating a differential. *See* Lisa A. Robinson & James K. Hammitt, *Research Synthesis and the Value Per Statistical Life* 6 (Harvard Kennedy School, Regulatory Policy Program, Working Paper RPP-2014-14, 2014) (noting there exist "relatively few studies that are likely to meet the selection criteria developed by the EPA and SAB"), https://www.hks.harvard.edu/index.php/content/download/70873/1256302/version/1/file/RPP_2014_14_Ro [https://perma.cc/MXS9-AY3D].

138. 2011 SAB REVIEW, *supra* note 66, at 10–12.

139. *See supra* Part I.B.

140. Even an alternative would be preferable to inaction. The EPA currently quantifies the prevention of fatal cancers the same as other fatalities and separately quantifies the aversion of non-fatal cancers for rulemakings. However, there is no reason why the EEAC could not recommend that the EPA temporarily, in lieu of a differential, add the statistical value of a normal fatality averted to the value of a non-fatal cancer to come up with a measure for fatal cancer that considers both the death and morbidity period. Such a measure was briefly mentioned at the EEAC's March 2016 meeting but is ultimately rejected in its Report. SAB 2017 REVIEW, *supra* note 7, at 51–52. However, there may be concern that simple addition may overvalue (or perhaps undervalue) cancerous fatalities all the same.

141. CIRCULAR A-4, *supra* note 2, at 13.

would have to be for the proposed regulation to break even in its cost-benefit analysis.[142] Under breakeven analysis, the EPA should adopt a cancer differential, since the benefits of avoiding untimely deaths would at least equal the costs of enacting the regulation (even if it may remain unknown to what extent the measure would break even).[143]

B. Examples from Regulatory Practice

The adoption of a temporary cancer differential is supported by the use of such a measure among foreign governmental agencies. Domestically, the trajectory of other quantification techniques, such as the SCC, provide analogical support for the institution of a temporary estimate to later be refined.

1. The European Example

In 2000, the Environment Directorate-General of the European Commission, the European Union's executive body, convened a workshop in Brussels on "the value of reducing the risk of ill-health or a fatal illness."[144] The conference was undertaken to develop guidance for analysts with the hope of improving cost-benefit analyses in the EU and its member states. The organizers aimed to ensure the Directorate-General used the "best current estimates of the monetary value of preventing the risk of . . . a fatal illness" when formulating policy and also sought to identify research needs.[145]

After the conference the Commission released a supplemental paper that provided guidance on the treatment of carcinogenic pollutants.[146] The paper recognized the importance of differentiating cancerous mortality from generic mortality because the former includes morbidity:

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142. *Id.*

143. *See id.* (casting breakeven analysis as "answer[ing] the question, 'How small could the value of the non-quantified benefits be (or how large would the value of the non-quantified costs need to be) before the rule would yield zero net benefits?'").

144. European Commission, Workshop on the Value of Reducing the Risk of Ill-Health or a Fatal Illness (2000), http://ec.europa.eu/environment/enveco/others/pdf/proceedings.pdf [https://perma.cc/LFW2-67GC].

145. *Id.*

146. European Commission, Recommended Interim Values for the Value of Preventing a Fatality in DG Environmental Cost Benefit Analysis (2000), http://ec.europa.eu/environment/enveco/others/pdf/recommended_interim_values.pdf [https://perma.cc/NMC3-WHRV].

> People may be willing to pay more to reduce their risk of dying from cancer than to reduce their risk of a fatal heart attack, because death from cancer may be preceded by a long period of serious illness. The value attributed to the risk of mortality from cancer should be treated the same as for other illnesses (i.e. the same Value [of a Statistical Life]). However, it is important that the 'cancer premium' relating to the period of ill health prior to death is also captured. However, the evidence on the size of this 'cancer premium' for the period of morbidity is minimal.[147]

Despite the "minimal" evidence, the European Commission ultimately settled on a 50% cancer differential to be applied to carcinogenic pollutants, a reflection of the assumption that the value of preventing a cancerous death is one and a half times the value assigned to non-cancerous mortality.[148] This value is designed to capture both the actual fatality and the morbidity that precedes it.[149] The Directorate-General recognized, despite the lack of overwhelming evidence pointing to one specific value, that it was important to institute a temporary differential to respect the willingness of the population to pay more for reductions in cancerous fatality risk compared to generic fatality risk.[150]

The Commission went through many of the same steps and thought processes in ultimately adopting a cancer differential as the EPA and its experts have gone through before. It relied upon evidence that suggested the Commission should adopt a cancer premium without specifying what that differential should be.[151] While the EEAC has allowed the better part of two decades to pass without adopting a cancer differential, the EU has taken early and meaningful action (with the premium they adopted equaling the one that the EEAC rejected in 2010).

2. The British Example

The United Kingdom has also instituted a cancer differential, valued at 100%.[152] The British cancer differential was first refer-

147. *Id.*
148. *Id.*
149. *Id.*
150. *See id.*
151. *See id.*
152. Though the United Kingdom and European Commission both recommend a cancer differential, the Organisation for Economic Co-operation and Development, whose member states include the United States, United Kingdom, and many European Union countries, concluded that their "literature review and meta-

enced in a 2001 guidance of the United Kingdom's Health and Safety Executive (HSE), an organization responsible for studying and regulating workplace and other risks in the UK.[153] The HSE noted that "people are prepared to pay a premium for the benefit of preventing a [cancerous] fatality" and, as such, "adopted a [VSL] twice that of the . . . benchmark figure."[154] Moreover, the HSE noted that research will be forthcoming "to assess the validity of this approach."[155] The Agency observed that willingness to pay may vary across different types of risk but largely avoids delving into such sub-categories; rather, the only risk that the HSE currently examines is a generic one for dying from cancer.[156]

Two years later, in 2003, the cancer differential was confirmed in *The Green Book* (which was updated in 2011), a production of Britain's Treasury department that offers guidance to government institutions on the valuation of "policies, programmes and projects, whether revenue, capital or regulatory."[157] In the section that discusses valuing mortality-risk reductions, the Treasury states evidence exists "that individuals are not indifferent to the cause and circumstances of injury or fatality."[158] To illustrate the operation of the cancer premium, *The Green Book* provides an example of doubling VSL for asbestos "to allow for individual aversion to dying from cancer, and the additional associated personal and medical costs."[159] However, *The Green Book* notes the differential was reached without relying on literature and indicates a longer-term

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regressions do not support adjusting VSL upwards if the regulation is targeting cancer risks. Thus, it is *not* recommended to adjust VSL for cancer risks, but to account for the costs of morbidity prior to cancer deaths separately." The Organisation also notes that, "a cancer premium was found in analyses of the full, unscreened dataset, but not in the analyses of the quality-screened models," suggesting the importance of the inputs and underlying study standards. ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT [OECD], MORTALITY RISK VALUATION IN ENVIRONMENT, HEALTH AND TRANSPORT POLICIES 132 (2012), http://dx.doi.org/10.1787/9789264130807-en [https://perma.cc/H8T2-QZXC].

153. UNITED KINGDOM HEALTH & SAFETY EXEC., REDUCING RISKS, PROTECTING PEOPLE: HSE'S DECISION-MAKING PROCESS (2001), http://www.hse.gov.uk/risk/theory/r2p2.pdf [https://perma.cc/PB4J-7BYK].

154. *Id.* at 65.

155. *Id.*

156. *Id.*

157. HER MAJESTY'S TREASURY, THE GREEN BOOK: APPRAISAL AND EVALUATION IN CENTRAL GOVERNMENT v, 1 (2011), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf [https://perma.cc/BJ86-SQX7].

158. *Id.* at 62.

159. *Id.*

study has been commissioned.[160] Still, UK government departments and agencies must adhere to *The Green Book*'s guidance and principles.[161] Like the European Commission, British regulators wasted little time and adopted an even more generous differential (despite the need to further refine that premium).

3. The Trajectory of the SCC

As demonstrated by the introduction into U.S. executive agency cost-benefit analyses of many quantitative methods prior to their perfection, including the SCC, the EPA should create a preliminary, rough cancer differential. The SCC "represents the value of damages avoided for a small emission reduction (i.e. the benefit of a CO_2 reduction)."[162] It is difficult to overstate the impact (or complexity) of this figure.[163]

SCC came into being through the labor of an "interagency working group" (IWG)[164] set up by the President's Council of Economic Advisors and Office of Management and Budget.[165] The Group agreed on a number of baseline assumptions that the EPA used in order to come up with an initial estimate for SCC "using three integrated assessment models."[166] In 2009 and 2010, the Group developed a set of SCC estimates based on different models and discount rates,[167] which it eventually published along with a very transparent methodology in a technical support document.[168]

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160. *Id.* at 62 n.19

161. *Id.* at 1–2.

162. *EPA Fact Sheet: Social Cost of Carbon*, *supra* note 28.

163. *See id.* (for example, calculating SCC entails understanding the intertwining dynamics between "climate processes, economic growth, and interactions between the two in a single modeling framework.").

164. *Id.* (the agencies involved include: "Council on Environmental Quality, National Economic Council, Office of Energy and Climate Change, and Office of Science and Technology Police, EPA, and the Departments of Agriculture, Commerce, Energy, Transportation, and Treasury."). As of publication of this Note, President Trump has disbanded the IWG and withdrawn many of the key documents it issued. *See* Exec. Order No. 13783, 82 Fed Reg. 16,093, 16,095 § 5(b) (Mar. 28, 2017).

165. *Id.*

166. *Id.*

167. *Id.*

168. Interagency Working Group on Social Cost of Carbon, U.S. Gov't, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (2010), https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf [https://web.archive.org/web/20170118134053/https://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf].

Next, the working group released[169] an updated estimate in 2013 as dictated by "the latest versions of the models . . . as used in the peer-reviewed literature."[170] After an opportunity for public comment on the SCC,[171] which garnered over 140 unique responses and 39,000 "form letters submissions,"[172] the IWG responded in 2015 in a detailed document and articulated next steps for improving the measure.[173] As of July 2015, multiple agencies seeking more accurate regulatory analyses had employed the SCC in thirty-four agency rulemakings.[174]

A cancer differential would differ from the SCC in that it is a less collaborative effort. Whereas developing the SCC involved the participation of a litany of agencies, so far only the EPA has demonstrated interest in a cancer differential. Still, should the Agency implement such a figure, other regulators may soon adopt it as appropriate.[175] Beyond stakeholders in development, a cancer differential could in many ways mirror the SCC. Like the SCC, a differential would be subject to public comment by virtue of the notice and comment rulemaking process. Further, the EPA could continue to update the specifics of a differential with new information, just as the SCC has incorporated feedback into a new iteration of its

169. Interagency Working Group on Social Cost of Carbon, U.S. Gov't, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (2013), https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf [https://web.archive.org/web/20170124055423/https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf].

170. *EPA Fact Sheet: Social Cost of Carbon*, *supra* note 28.

171. Interagency Working Group, *supra* note 168, at 4; Environmental Defense Fund, et al., *Comment Letter on Proposed Rule on Energy Conservation Standards for Walk-in Coolers and Commercial Refrigeration Rules*, at 4 n.11 (Nov. 12, 2013), http://policyintegrity.org/documents/Comments_on_use_of_SCC_in_Walk-in_Coolers_and_Commercial_Refrigeration_Rules.pdf [https://perma.cc/526F-LTAZ].

172. Interagency Working Group on Social Cost of Carbon, U.S. Gov't, Response to comments: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, at 4 (2015), https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf [https://web.archive.org/web/20170108143328/https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-response-to-comments-final-july-2015.pdf] [hereinafter 2015 Working Group on Cost of Carbon Response to Comments].

173. *See id.*

174. *Id.*

175. *See* Livermore, *supra* note 9, at 661–66 (explaining how OIRA review facilitates information sharing and approach harmonization among executive branch agencies).

model. The SCC is a success story that can pave the way and provide a model for implementing a cancer differential.

Looking ahead, SCC will benefit from the OMB's "plans to obtain expert, independent advice from the National Academies of Sciences, Engineering, and Medicine on how to approach future updates."[176] This assistance is designed to bolster the methodological and technical basis of the SCC measure, which are already quite well grounded.[177] In the course of updates and public comments, the IWG and its constituent agencies agreed to continue using the SCC estimates for "regulatory impact analysis until further updates can be incorporated into the estimates."[178]

The SCC provides an example of regulators implementing a measure as they perfect and develop it. Any impression that adopting the SCC was easy or without controversy—even outside of the political sphere and purely from a scientific standpoint—is quickly dispelled by a glance at the many highly technical and rigorous comments garnered during the OMB's call for public input.[179] Such comments, including those submitted as part of an organized form-letter campaign, "covered a wide range of topics including the technical details of the modeling, the aggregation and presentation of the results, and the process by which the SCC estimates were derived."[180] Additionally, "[t]he unique comment letters offered a wide range of perspectives on the process, methodology, and results, including both support and opposition."[181] If a measure of such importance can be adapted from an imperfect and contested starting point as more information becomes available, so too can a cancer differential. And such a differential would be stronger for the exposure to comments, feedback, and new data as it evolved.

C. The Discontents of Individuation

As noted in Part I.B, quantifying VSL relies on determinations of individuals' willingness to pay to avoid certain risks. The notion of a cancer differential proceeds from the premise that individuals are willing to pay more to avoid cancerous fatalities than non-cancerous fatalities due to the value they place on avoiding morbidity, dread, fear, and other characteristics of cancerous death. Some

176. *EPA Fact Sheet: Social Cost of Carbon*, *supra* note 28.

177. *See id.*

178. *Id.*

179. 2015 Working Group on Cost of Carbon Response to Comments, *supra* note 172, at 2–4.

180. *Id.* at 4–5.

181. *Id.* at 5.

scholars believe that characteristics besides cancer, such as age or wealth, should also be used in developing VSLs. They maintain that including such variables will more precisely reflect the preferences of populations who feel the impacts of a given regulation than a generic VSL, which in turn better respects the agency of individuals to allocate their resources. In reliance on the premise of VSL reflecting willingness to pay, these scholars seek to tailor that figure as closely as possible to the actual willingness to pay of regulated individuals. The push to tailor VSL as closely as possible to the preferences of those benefitting from regulation is what Cass Sunstein refers to as "individuation."[182] Though perhaps theoretically sound, the pursuit of extensive individuation is ethically fraught and may lead to deeply inequitable results.[183] As such, the conceptualization of a cancer differential as a limited and distinct regulatory change is philosophically quite distinct from the full individuation of VSL.

The quest to adapt VSL figures across different types of demographics and risks has muddled the discussion of a cancer differential. The EEAC paints the cancer differential as something that can and should wait until the EPA develops a program for individuating VSL across nuanced demographic and risk variables. Conflating the cancer differential with a more general analytic framework such as full individuation is a mistake that belittles the fundamental normative concerns at play. Beyond the initial critiques offered here, there exists an extensive literature that questions the idea of individuation (particularly across demographics) on resource-allocation and moral grounds.[184] For the purposes of this Note, suffice it to say that full individuation is not a desirable goal and discussion of its pursuit should not undercut progress toward a discrete and achievable cancer differential.

Sunstein observes that agencies currently do not tailor or individuate their VSLs.[185] However, Sunstein believes that agencies should do so; since as "[e]ach person in society is willing to pay a

182. CASS SUNSTEIN, VALUING LIFE: HUMANIZING THE REGULATORY STATE 85 (2014) ("No agency treats young people as worth more than old people. No agency values the lives of poor people less (or more) than the lives of rich people. No agency distinguishes between whites and African Americans or between men and women.").

183. *See generally* MATTHEW ADLER, WELL-BEING AND FAIR DISTRIBUTION: BEYOND COST-BENEFIT ANALYSIS (2012) (arguing for the use of social welfare functions rather than a VSL paradigm that engenders sensitivity to wealth disparities in policy).

184. For a leading example that provides a comprehensive review of issues Sunstein raises and those that might be marshaled against his view, see *id.*

185. SUNSTEIN, *supra* note 182 at 85.

distinctive amount to avoid each risk," those preferences should be honored.[186] To him, it is not only a matter of "conceptual clarity," but also the right thing to do.[187] Consider the example of an individual with little wealth contemplating how to allocate resources for risk reduction (naturally, individuals with less wealth have less willingness to pay due to the scarcity of financial resources).[188] Would he necessarily choose to pay the same amount as those with average or high wealth for, say, a reduction in mortality risk from a certain pollutant? Sunstein contends that forcing one to "pay" for regulations above their willingness to do so undercuts welfare by requiring the individual to purchase a risk reduction they do not seek instead of something that might provide more marginal welfare like food, medicine, or education.[189] In addition, the same forced exchange disrespects autonomy because it does not allow individuals to make those choices themselves,[190] but instead amounts to a poor method of redistributing wealth.[191] Sunstein takes pains to point out that his notion of individuation is not radical but in fact mimics decisions that individuals make daily. After all, differences in risk preferences are apparent in "ordinary consumer markets, which establish prices for the reduction of the statistical risks associated with smoke alarms, unusually safe cars, and much more," simply as a result of "different values, tastes, and situations."[192] However, he is also quick to protect himself against inevitable criticism, particularly regarding individuation across demographics. Specifically, he argues that any individuation that results in disparate VSLs for different races, for example, would "not be a product of any kind of group-level discrimination on the government's part" but rather "the result of disaggregating VSLs for individuals."[193]

Tailoring VSL to every imaginable subgroup and risk matches Sunstein's notion of individuating regulatory analysis at an optimal level.[194] This is an expansive and hugely complex endeavor with wide scope. However, the normative thrust behind a cancer differential is much more tailored, its scope limited to a single set of scenarios: cancerous fatalities. As Professor Richard Revesz has articulated, a differential focuses on the undervaluing of exclusively

186. *Id.* at 87.
187. *Id.* at 88.
188. *Id.*
189. *Id.* at 113–14.
190. *Id.* at 115.
191. SUNSTEIN, *supra* note 182, at 90.
192. *Id.* at 87.
193. *Id.*
194. Sunstein, *supra* note 72; *see supra* Part I.A.

latent harms.[195] Sunstein's and Revesz's approaches to adjusting VSL to account for specific varieties of risk are radically different. Imagine a sprinkler system is not working as expected because of one errant spigot. The difference in these approaches is akin to that between adjusting the water pressure for the single malfunctioning spigot (implementing a cancer differential) and neglecting the problem because one day you plan to dig up and reengineer the entire sprinkler system (Sunstein's optimal individuation).

This Note has advocated for the imposition of a cancer differential in EPA regulatory analysis, but not for full individuation of VSL. Individuation raises troubling moral issues, such as the potential for VSL to "yield what are often viewed as inequitable evaluations of policy change" through the unequal valuation of reductions in mortality risk among population subsets.[196] In other words, individuation could lead to wildly morally questionable results: valuing white lives, male lives, young lives, or wealthy lives more than those of other sub-groups. For example, one study that analyzed VSL across demographics found that "VSL is highest for white males and lowest for African American males, with white and African American females falling between the poles."[197] Other studies have found yet more disturbing results, including studies of demographic sub-groups that yield a zero or even negative VSL based on wage data. For instance, one study of African American workers nonsensically pegged the group's VSL at zero.[198] Another study found a negative VSL for nonunionized workers, as those studied earn less when they face increased mortality risk.[199] Any philosophical framework that would dispose of human dignity by giving weight to such counterintuitive and deeply troubling results surely does not deserve the embrace of the regulatory state. Additionally, calculating VSL for very limited cross-sections of society threatens to reinforce disparities that currently exist among genders, ages, ethnicities, and other traits through legitimizing them.

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195. Revesz, *Environmental Regulation*, *supra* note 35; *see supra* Part I.A.

196. Matthew D. Adler et al., *The Social Value of Mortality Risk Reduction: VSL Versus the Social Welfare Function Approach*, 35 J. HEALTH ECON. 82, 83 (2014).

197. White males have a VSL of $18.8 million, while African American males have a VSL of $5.9 million. SUNSTEIN, *supra* note 182, at 105 (citing W. Kip Viscusi, *Racial Differences in Labor Market Values of a Statistical Life*, 27 J. RISK & UNCERTAINTY 239, 252 (2003)).

198. *Id.* at 93–94 (citing John D. Leeth & John Ruser, *Compensating Wage Differentials for Fatal and Nonfatal Injury Risk by Gender and Race*, 27 J. RISK & UNCERTAINTY 257, 270 (2003)).

199. *Id.* at 93 (citing W. Kip Viscusi & Joseph E. Aldy, *The Value of a Statistical Life*, 27 J. RISK & UNCERTAINTY 5, 44 (2003)).

Furthermore, agencies cannot feasibly implement individuation. Sunstein even readily admits that "a fully individuated VSL is not feasible," noting that insufficient data would force regulators to generalize their efforts through aggregation (like the current model), and that the collective nature of many regulated goods requires "a single VSL, not a range of VSLs."[200]

The inability of the EPA to adopt a cancer differential to date underscores the impossibility of producing an individuated VSL. The tremendous time, energy, and rigor required to produce a VSL that accounts for the risk of developing cancer in general has yet to yield an application. Now imagine a similar effort targeting an array of variables and sub-classes rather than just one larger class of people. Crafting accurate estimates for intersecting risks and demographics would require a massive investment of time and resources that dwarfs those already invested in a much less fine-grained exploration. Moreover, a fully individuated VSL may never truly be knowable short of some sort of brain implant that can provide precise risk-aversion valuations for specific individuals because, after all, that is the ultimate end-game of individuation: understanding the exact preferences of individuals who regulation affects and calibrating such regulation to match their preferences.[201] Rather than remain in this purgatory of competing theories, the EPA should, with the EEAC's blessing, adopt a cancer differential immediately.

D. The Road Forward and Toward a Home-Grown, Permanent Solution

The EPA should adopt a temporary cancer differential for use in regulatory analysis consistent with the most up-to-date studies. However, while such a solution is called for, it would certainly not be permanent. Two things would be required to make the cancer differential a continuing success after the establishment of a preliminary figure. First, the EPA must follow through on an schedule under which it would regularly reevaluate the VSL and attendant differential based on new data.[202] Second, the EPA should engage in and sponsor research to improve and sharpen the cancer differ-

200. SUNSTEIN, *supra* note 182, at 87–88.

201. *See id.* at 106–07.

202. The EPA itself acknowledges the need to update estimates from time to time and survey the most recent literature. 2010 EPA WHITE PAPER, *supra* note 31, at 25.

ential.[203] Though such research may very well occur outside the governmental sphere, public involvement in refining a cancer premium is imperative to ensure the cultivation of usable data.[204] Furthermore, the EPA must continue to fund private innovations regarding quantification, as it has in the past.[205] The SAB has implicitly endorsed this step by calling for the EPA to "encourage more studies that examine how VSL may differ for different mortality risks."[206] These resources should be focused on studies that "compare values for cancer and other risk reductions," which are most promising for creating a lasting, meaningful differential.[207] Such literature will fill a gap and resolve the barrier the EPA and EEAC have created by so narrowly restricting the parameters of studies they deem acceptable for use in setting regulatory values.

Finally, the EPA must take charge and apply its internal resources to improving methods for quantifying cancer differentials. Focused governmental intervention in research can have and has had a tremendously beneficial impact on the growth of quantification methodologies.[208] Take the EPA's own efforts to centralize and standardize the VSL calculation through an Economic Consistency Workgroup as an example.[209] In that case, the Workgroup "compiled insights from a number of sources, including its own and other agencies' existing guidelines, contemporary modeling techniques, and the advice of the EPA Science Advisory Board," which led to the issuance of "guidelines" and a proposed agency-wide VSL.[210] It is plain to see just how far the legitimacy and use of that

203. *See* SAB 2000 REVIEW, *supra* note 47, at 19; Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1450 (calling for government support for quantification research more generally).

204. Funding alone is not sufficient. The SAB has consistently agreed, calling for additional research both by the EPA and by the "broader research community" to fill any "gaps" that exist with respect to valuation. SAB 2000 REVIEW, *supra* note 47, at 19.

205. *See* Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1450 (arguing for government funding of quantification studies and criticizing past "haphazard" efforts).

206. SAB 2017 REVIEW, *supra* note 7, at 51.

207. SAB 2011 REVIEW, *supra* note 66, at 12.

208. *See* Revesz, *Quantifying Regulatory Benefits*, *supra* note 28, at 1454–56 (discussing government innovations around the Social Cost of Carbon and Value of Statistical Life but lamenting the lack of government action in other areas of benefit quantification).

209. *Id.* at 1455.

210. *Id.*

now foundational measure has come;[211] a similar success story awaits the cancer differential.

CONCLUSION

Within the administrative state and adjacent academic circles, there is a movement toward tailoring VSL calculations across demographics and risk characteristics. Encapsulated within this context is a much narrower debate regarding whether preventing cancerous fatalities should be valued like preventing instantaneous fatalities. These issues, though related, should not be confused, and the complexity and normative perils of one should not undermine the progress of the other. The EPA should adopt a cancer differential to stop its systematic undervaluation of cancerous fatalities in cost-benefit analysis.

For over sixteen years, the EPA has recognized that people value decreasing cancerous mortality risk more than non-cancerous mortality risks.[212] In 2010 the EPA sought to improve its regulatory analysis practices to reflect this important distinction, but the EEAC criticized the differential and declined to support it. Now, over five years after the first proposal of a differential, the EEAC has again embraced the same conclusions as before. Though the EEAC's findings are technically only recommendations, their impact on EPA decisionmaking is clearly significant, if not decisive.[213] Still, an opportunity remains for the EPA to boldly embrace a differential.

The institution of a positive cancer differential would bring U.S. regulatory practice in line with that of Europe and would also be consistent with prior practice of implementing a quantification technique based on a temporary estimate, as the case of the SCC demonstrates. Embracing a temporary, imperfect measure now is preferable to ignoring a well-documented oversight in our regulatory analytical architecture. Doing what can be done when it can be done and learning from that experience is a path that follows the most laudable traditions of the U.S. regulatory state. Most importantly, a cancer differential will save lives while respecting the principles of administrative governance.

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211. *See* CIRCULAR A-4, *supra* note 2, at 29–31 (describing best practices for quantifying fatality risks).

212. *See* SAB 2000 REVIEW, *supra* note 47, at 5.

213. *EPA Science Advisory Board (SAB)*, U.S. ENVTL. PROT. AGENCY, https://yosemite.epa.gov/sab/sabpeople.nsf/WebCommittees/BOARD [https://perma.cc/92BT-XQ64].