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Melissa Luttrell

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The Case for Differential Discounting: How a Small Rate Change Could Help Agencies Save More Lives and Make More Sense

Melissa J. Luttrell*

Over the past thirty years, the dominant rationale for mandatory, formal cost-benefit analysis (CBA) of federal health, safety and environmental regulations has changed from "CBA operates as a necessary institutional roadblock against power-hungry regulators" to "CBA is a neutral tool that assists regulators in identifying welfare-maximizing regulatory options." However, despite this change in intention and justification, the actual CBA methodologies the OMB directs the agencies to use haven't changed much in three decades, and still reflect the strong anti-regulation sentiment of the Reagan administration. One methodological choice that continues to operate as a very powerful bias against protective regulatory standards is the OMB directive that executive agencies must discount the public health and environmental benefits of regulation at the same rate used for monetary costs.

The standard argument against using a lower discount rate for health, safety and environmental benefits is that this would cause agencies to defer cost-beneficial regulations ad infinitum*; under differential discounting, it is argued, a beneficial regulation would always produce more net benefits if its implementation were delayed another year, and so no rational agency would ever implement anything. This article demonstrates that this "perpetual delay" argument relies on an invalid assumption; once this assumption is eliminated, any perpetual delay phenomenon disappears.*

Next, several "opportunity cost" arguments for equal discounting are shown to conflate the choices theoretically available to society as a whole with the outcomes actually available to regulatory agency decision makers. While the opportunity costs of any alternative investments actually displaced by regulations may be relevant considerations for regulators, the

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* Visiting Assistant Professor of Law, Florida International University College of Law. Thank you to Frank Ackerman, Ronald Allen, Juan Javier del Granado, Katherine Florey, John Patrick Hunt, Andrew Koppelman, Arden Rowell, Sidney Shapiro and Elizabeth Strawn for providing helpful feedback, thoughts and/or advice on portions of this project, to Kathleen Luttrell and the editors and staff of the *William & Mary Policy Review* for valuable editorial suggestions, and to Stephanie Nunez for research assistance. I am also grateful to the participants in the 2011 Florida Legal Scholarship Forum at Stetson University College of Law and to two anonymous peer reviewers. All opinions and any errors are my own.

arguments—premised on opportunity cost—that logic compels equal discounting of regulatory costs and benefits all fail.

Finally, the article summarizes and discusses the substantial evidence that the discount rate agencies apply to the non-fungible, often intangible public health and environmental benefits of regulation should be significantly lower than the rate used for monetary costs within the same cost-benefit analysis.

INTRODUCTION

In 1979 and 1980, presidential candidate Ronald Reagan railed against the "arrogance"[1] of federal regulation of business and promised to take major steps to rein in the executive agencies.[2] He kept his promise. One of his first acts, upon taking office, was to establish a cabinet-level "Task Force on Regulatory Relief," populated with some of Washington's most ardent anti-regulation ideologues, and with the stated agenda of scaling back the regulatory state and holding the regulators at bay.[3]

Executive Order 12291 soon followed. It established that no major executive agency rule could be so much as proposed in the Federal Register until it passed a rigorous quantitative cost-benefit analysis.[4] The Task Force, believing even Reagan's own regulatory appointees would likely oppose the order, had worked quickly to ensure it was finalized before any new regulatory agency heads were in place.[5]

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1 Jane Seabarry, *Reagan Decries Government; Too Much Government Denounced by Reagan*, WASH. POST, June 14, 1979, at D1.

2 Diane Curtis, *Reagan Vows to Try To Halt 'Deluge' of Japanese Autos*, WASH. POST, Sept. 3, 1980, at A2 ("'If I am elected, and have an administration, I'd go a lot further than a little tinkering with regulations,' Reagan said. 'I'd like to get rid of several thousand of what I think are unnecessary regulations that have caused your problems.'"); Merrill Brown, *Thumbs Could Twiddle When Regulations Burn*, WASH. POST, Sept. 4, 1980, at D1; *Reagan's Victory Buoys Business*, CHEM. WEEK, Nov. 12, 1980, at 16 ("While he was on the campaign trail, President-elect Ronald Reagan seemingly pushed all the right buttons for business. He would . . . ease up on regulations to 'get government off the backs of the people,' as Murray L. Weidenbaum, head of Reagan's regulatory task force, put it.").

3 Ronald Reagan, Remarks Announcing the Establishment of the Presidential Task Force on Regulatory Relief, Jan. 22, 1981, *available at* http://www.presidency.ucsb.edu/ws/index.php?pid=43635; Thomas O. McGarity, *Regulatory Reform in the Reagan Era*, 45 MD. L. REV. 253 (1986). *See also* JAMES C. MILLER, FIX THE U.S. BUDGET!: URGINGS OF AN "ABOMINABLE NO-MAN" 2–3 (Hoover Institution Press, 1994); *Reagan's Victory Buoys Business*, *supra* note 2, at 16.

4 Exec. Order No. 12,291, 46 Fed. Reg. 13,193 (Feb. 17, 1981).

5 MILLER, *supra* note 3, at 3. A draft of the executive order was circulated to the other members of the cabinet over the Washington's Birthday holiday weekend, and, despite complaints from some cabinet members that they had been unable to have it reviewed by attorneys over the long weekend, was signed by the president the next business day, Feb. 17, 1981. *Id*. at 3 n. 5.

The dominant philosophy on the task force was a public choice perspective of administrative rulemaking.[6] In the words of James Miller, the task force member given primary responsibility for enforcing the regulatory reform agenda at OMB's Office of Information and Regulatory Affairs (OIRA): "Given that the raison d'être of regulators is to regulate, they will produce regulations without end—bad ones as well as good ones."[7]

Considering this attitude, it is perhaps not surprising that some of the specific methodologies Miller's OIRA requested the agencies follow in their cost-benefit analyses were biased against health, safety and environmental protections, to the point where their likely economic effect was to reduce net social welfare by causing agencies to under-regulate.[8] What *is* surprising is that several quite powerful anti-regulation biases have persisted through each update of the OIRA guidelines, and have remained basically unchanged since the Reagan administration.[9]

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[6] *Reagan Tells Regulators to Analyze Costs*, CHEM. WEEK, Feb. 25, 1981, at 15 ("Under the new plan, OMB has unprecedented authority to veto and rewrite regulations even before executive agencies officially propose them. While this power is likely to be challenged in the courts, Reagan's deregulators feel it's needed, since even the best-intentioned appointees can be 'captured' by the agencies they head. . . . The order will place a heavy procedural burden on the agencies, which are struggling to meet statutory deadlines while facing major personnel and budget cutbacks."); *see also* Frank B. Cross, *Executive Orders 12,291 and 12,498: A Test Case in Presidential Control of Executive Agencies*, 4 J.L. & POL. 483 (1988) (the impetus for E.O. 19221 was "President Reagan's perception that federal government agencies overregulate"); MILLER, *supra* note 3, at 2.

[7] MILLER, *supra* note 3, at 2; Lawrence Mosher, *Reaganites, with OMB's List in Hand, Take Dead Aim at EPA's Regulations*, NAT'L J., Feb. 14, 1981, at 256 ("James C. Miller III, head of the OMB office that compiled an analysis of environmental regulations by EPA: 'We're going to be putting down very hard rules for them.'").

[8] *Cf.* RICHARD L. REVSZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY 11 (Oxford University Press 2008); *see also* discussion *infra* note 9.

[9] Examples of anti-regulation biases that have persisted through each version of these guidelines, besides the discounting requirement that is the subject of this paper, include the manner in which regulatory costs and benefits are quantified and monetized (as applied, these requirements have tended systematically to undervalue regulatory benefits, which tend to be more difficult than costs to quantify and monetize, while the process for estimating costs tends to produce inflated numbers). *See* LISA HEINZERLING, COMMENTS ON DRAFT OMB REPORT AND COST-BENEFIT GUIDELINES, CENTER FOR PROGRESSIVE REGULATION (Apr. 3, 2003), *available at* http://www.whitehouse.gov/sites/default/files/omb/assets/omb/inforeg/2003report/251.pdf; Frank Clemente & Melissa Luttrell, *Comments on the 2001 Draft Report to Congress on the Costs and Benefits of Federal Regulations*, PUB. CITIZEN (Aug. 15, 2001), *available at* http://www.citizen.org/documents/ACFCF.pdf; s*ee also* David M. Driesen, *Is Cost-Benefit Analysis Neutral?*, 77 U. COLO. L. REV. 335 (2006) (agency cost-benefit analyses systematically point agencies toward less protective regulations); Thomas O. McGarity & Ruth Ruttenberg, *Counting the Cost of Health, Safety and Environmental Regulation*, 80 TEX. L. REV. 1997 (2002) (CBA cost estimates tend to be too high). In addition, agencies are specifically directed not to be conservative in their assumptions regarding risks to public health and the

Executive Order 12291, and its successor, Executive Order 12866,[10] have long been unpopular with environmentalists, consumer groups, and other public-interest constituencies that oppose the use of CBA as a decision criterion. In February 2009, the Obama administration solicited recommendations for a replacement executive order, receiving a sizable response.[11] But Executive Order 12866 was never replaced, and, on January 18, 2011, President Obama signed Executive Order 13563, re-affirming his administration's commitment to CBA of new executive agency regulations (a process still overseen by OIRA), and directing the agencies to apply CBA principles to a comprehensive look-back review of existing regulations.[12]

The current OIRA administrator is Cass Sunstein, widely regarded as one of the most brilliant legal minds of our day; at the time of his nomination, Sunstein was described by Obama as both a "dear friend" and "the most cited law professor on any faculty in the United States."[13] In his extensive scholarship on CBA, Sunstein strongly supports the use of CBA in administrative decision-making,[14] although he has expressed concern that real-world agency analyses have often been crudely done,[15] have

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environment, but instead to use "best estimates" of risk—another practice that likely causes agencies systematically to underestimate the need for regulatory protections. *See* Thomas O. McGarity, *A Cost-Benefit State*, 50 ADMIN. L. REV. 7, 27–29 (1998).

OMB guidance documents implementing the cost-benefit analysis requirements of Executive Order 12291, and its successor, Executive Order 12866, include: OFFICE OF MGMT. & BUDGET, INTERIM REGULATORY IMPACT ANALYSIS GUIDANCE (1981), *reprinted in* 12 ENV'T REP. (BNA) 258 (1981); Office of Mgmt. & Budget, *Regulatory Impact Analysis Guidance, Appendix V*, *in* REGULATORY PROGRAM OF THE UNITED STATES GOVERNMENT 653–66 (1990); OFFICE OF MGMT. & BUDGET, GUIDELINES AND DISCOUNT RATES FOR BENEFIT-COST ANALYSIS OF FEDERAL PROGRAMS (1992), *available at* http://www.whitehouse.gov/sites/default/files/omb/assets/a94/a094.pdf; OFFICE OF MGMT. & BUDGET, ECONOMIC ANALYSIS OF FEDERAL REGULATIONS UNDER EXECUTIVE ORDER 12866 (1996), *available at* http://www.neutralsource.org/content/article/detail/727; OFFICE OF MGMT. & BUDGET, CIRCULAR A-4, REGULATORY ANALYSIS (Sept. 17, 2003). *See also* OFFICE OF MGMT. & BUDGET, AGENCY CHECKLIST: REGULATORY IMPACT ANALYSIS, *available at* http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/RIA_Checklist.pdf (last visited November 16, 2010).

[10] Exec. Order No. 12,866, 3 C.F.R. 638 (1993), *reprinted in* 5 U.S.C. § 601 (1994).

[11] Office of Mgmt. & Budget, Request for Comments on OMB Recommendations for a New Executive Order on Regulatory Review, 74 Fed. Reg. 8819-01 (Feb. 26, 2009); *see also* set of 183 public comments compiled at http://www.reginfo.gov/public/jsp/EO/fedRegReview/publicComments.jsp (last visited Dec. 18, 2011).

[12] Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011).

[13] Press Release, White House Office of the Press Secretary, President Obama Announces another Key OMB Post (Apr. 20, 2009), *available at* http://www.whitehouse.gov/ the_press_office/President-Obama-Announces-Another-Key-OMB-Post.

[14] *See generally* CASS SUNSTEIN, RISK AND REASON (2002).

[15] Robert Hahn & Cass Sunstein, *A New Executive Order for Improving Federal Regulation? Deeper and Wider Cost-Benefit Analysis*, 150 U. PA. L. REV. 1489, 1514–15 (2002) ("The information provided in an RIA is often badly incomplete, and the level of detail and analytical sophistication varies across agencies and types of regulations.").

sometimes been improperly biased against regulation,[16] and can produce almost indeterminate results.[17] Interestingly, in this (pre-OIRA appointment) scholarship on CBA, Sunstein noted that agencies technically are not bound by OMB's methodological guidelines on CBA;[18] however, in his present position, he is working to ensure that agencies comply more fully with these guidelines' "requirements"[19] and so it must be assumed that the OMB's methodological guidelines will continue to play a significant role in shaping federal health, safety and environmental standards.

The latest OMB guidelines enumerating the specific methodologies agencies are to use in their cost-benefit analyses of regulations ("OMB Guidelines") were released in 2003.[20] While there are a number of methodological choices in the OMB Guidelines that are likely to cause agency analyses to be systematically biased against health, safety and environmental protections,[21] this paper focuses on only one: the directive that agencies must apply the same discount rate to regulatory costs as to regulatory benefits. The merits of CBA, as a decision-making tool, are hotly contested. But whether one supports the current role of CBA in agency health, safety and environmental rulemaking, or whether one opposes this role on ethical, legal, and/or policy grounds (as I do),[22] it seems uncontroversial that the agencies producing CBAs (whether under duress or out of an affirmative desire to employ the technique) should endeavor to eliminate any improper, anti-regulation biases contained within the methodology, and that OIRA should support any methodological changes that would improve the accuracy and rationality of agency CBAs.

Discounting can have an enormous impact on how good (or bad) a regulation appears. The primary reason for discounting is to account for the changing value of money, depending on when in time the money will be received or spent. The present value of a dollar received today is greater

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16 *See* SUNSTEIN, *supra* note 14, at 227 ("the use of a [OMB-recommended] 7 percent discount rate, if it decisively affects the ultimate decision, would seem to be legally doubtful").

17 *Id*. at 153–90.

18 Cass R. Sunstein & Arden Rowell, *On Discounting Regulatory Benefits: Risk, Money, and Intergenerational Equity*, 74 U. CHI. L. REV. 171, 172 (2007); *see also* SUNSTEIN, *supra* note 14, at 225.

19 *See* OFFICE OF MGMT. & BUDGET, AGENCY CHECKLIST, *supra* note 9. Of course, seeking expanded compliance is not necessarily inconsistent with the view that compliance is voluntary.

20 OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9. Note that EPA publishes its own guidelines on the economic analysis of regulations; these guidelines, like OMB's guidelines, call for the use of equal discounting. ENVIRONMENTAL PROTECTION AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES 6–20 (2010) ("In all cases social benefits and costs should be discounted in the same manner[.]").

21 HEINZERLING, *supra* note 9; *see also supra* text of note 9.

22 *See, e.g*, Clemente & Luttrell, *supra* note 9, at 2.

than that of a dollar to be received twenty years from now, even controlling for inflation; this is primarily because a dollar received today can be invested and made to grow. For this reason, economic analyses that involve monetary gains and losses over time generally employ discounting.

But the OMB requirement for equal discounting means that all goods—even health and environmental benefits that cannot be invested—must be discounted at the same rate as monetary costs. Such discounting can dramatically lower the apparent value of health, safety and environmental regulation:

> Consider, for example, OSHA's lockout/tagout regulation[.] OMB has estimated the regulation costs $70.9 billion for each premature death it prevents. OSHA, which did not discount future benefits, estimated the cost for each premature death avoided as between $190,000 and $1.2 million.[23]

The effect of discounting is especially pronounced for health standards that prevent long-latency diseases. For example, the Mine Safety and Health Administration's proposed new respirable coal dust exposure limit will protect miners from diseases, such as black lung disease and emphysema, that often take decades to materialize.[24] In addition, the miners who have already had occupational exposure to coal dust at current levels will continue to have a heightened risk for disease and premature death long after the new permissible exposure limit takes effect, and possibly for the rest of their lives; MSHA has therefore concluded that its rule will offer the greatest protection to workers who enter the mining occupation after the rule takes effect, and it estimates it will take approximately 45 years for the entire workforce to turn over.[25] Since the delay between occupational exposure and consequential premature death may be 40 years (or more)[26]—and since it will take about 45 years for the relevant workforce to turn over—if the number of affected workers remains at current levels, it may well take 85 years or more for the full annual lifesaving benefits of the regulation to be actually observed.

Figure 1, below, illustrates the effect of equal discounting on rules—like MSHA's new respirable coal dust standard—that have substantial upfront costs but are expected to take many decades to demonstrate their full lifesaving potential. This area chart shows annual net benefits over time

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[23] Testimony of Sidney A. Shapiro before the Senate Committee on Governmental Affairs, April 22, 1999.

[24] Mine Safety & Health Admin., Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors, 75 Fed. Reg. 64,412 (proposed Oct. 19, 2010) (to be codified at 30 C.F.R. §§ 70, 71, 72, 75, and 9).

[25] *See* MINE SAFETY & HEALTH ADMIN., PRELIMINARY REGULATORY ECONOMIC ANALYSIS FOR LOWERING MINERS' EXPOSURE TO RESPIRABLE COAL MINE DUST INCLUDING CONTINUOUS PERSONAL DUST MONITORS 11 (2010).

[26] *See id.*, *see also* Arévalo Galeano et al., *Abstract: Anthracosilicosis: A Rare Clinical and Radiological Presentation Simulating Lung Metastases*, 51 RADIOLOGIA 601 (2009) (latency of more than 50 years).

for a hypothetical proposed rule that would prevent premature death from exposure to toxins, when costs are discounted at 5% and benefits are discounted at either 5%, 1.5%, or 0%. This hypothetical rule has total social costs of $93 million in 2011, its first year in effect, with annual costs declining until they stabilize, in 2017, at $25 million. The benefits, in the form of averted deaths, first become patent 23 years after the rule begins to generate costs, with the annual number of deaths averted gradually increasing until it stabilizes, in 2099, at 30 averted deaths per year. (CBA requires that lives saved be converted into dollar equivalents; here, averted deaths are valued at $9,000,000 in constant, inflation-adjusted 2011 dollars.)

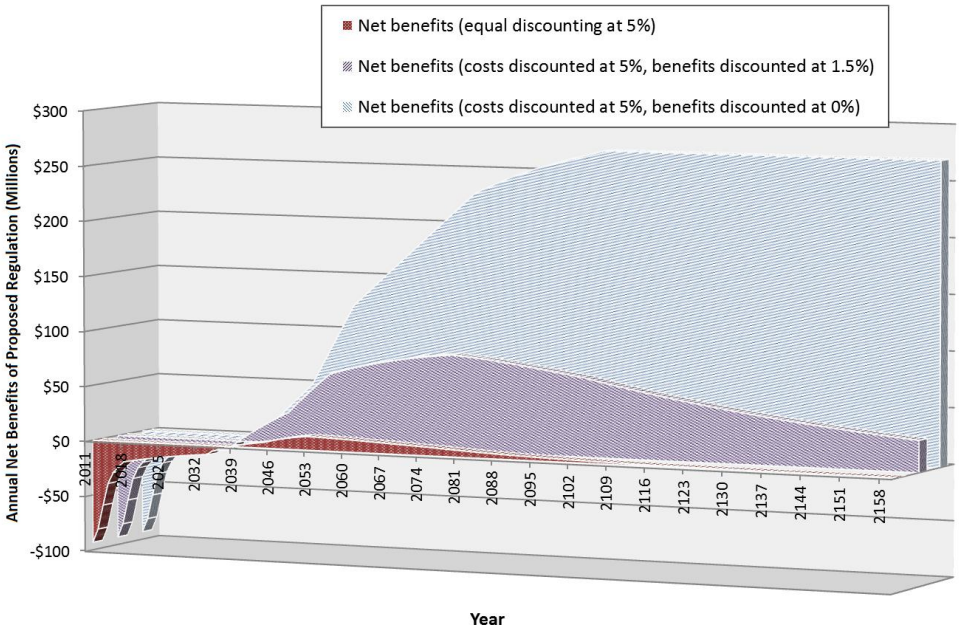

Figure 1: Present Value of Annual Net Benefits for Hypothetical Health Standard over Time, under Equal and Differential Discounting

Under equal discounting, when both costs and benefits are discounted at 5%, this hypothetical rule fails CBA. That the rule, over its lifetime, would have net social costs under equal discounting (at 5%) can be seen graphically: under equal discounting, the area above the horizontal $0 line is smaller than the area below it. However, if the agency analyst were permitted to use differential discounting, this rule could easily pass CBA. When regulatory benefits are discounted at 0%, the rule's benefits are overwhelmingly greater than its costs (again, this can be seen graphically by comparing the area above the $0 line with the area below it), and this difference would be even greater if the rule's continuing benefits were plotted out for additional years. Even when benefits are discounted at 1.5%, the hypothetical rule still easily passes CBA. In short, the decision to discount the health and environmental benefits of regulation at the same

rate as monetary costs can have a major impact on how cost-beneficial a rule appears, and can determine whether a rule passes CBA at all.

In responding to critics of equal discounting, both OMB and the leading commentators supporting equal discounting concede that health goods cannot be invested like money and thereby made to grow.[27] Instead, the case for discounting all goods at the monetary rate is largely a negative case: failure to discount costs and benefits at the same rate, it is argued, would cause absurd, paradoxical results.[28] While there are a number of positive arguments for applying *some* discount rate to intangible regulatory benefits that will accrue to the future, they generally do not mandate *equal* discounting.[29] The exceptions, the positive arguments for equal discounting, are all variations of a flawed opportunity cost argument.

This Article proceeds in three parts. Part I will show that differential discounting[30] will not create any paradoxes or generate absurd results. The standard argument against using a lower discount rate for health benefits is that this would cause agencies to defer good (or, "cost-beneficial") regulations *ad infinitum*, because at any point in time such a regulation would always produce more benefits if it were started in the future than if it were started in the present. This argument is incorrect. Actually, the only cost-beneficial regulations that would be perpetually deferred under differential discounting (even assuming that a 0% rate is used for health, safety and environmental benefits) are those that: (1) must expire after some fixed period of time (e.g., the agency must issue a regulation that will last for one year only, and it is impossible for the program to be extended);

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[27] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34; John D. Graham, *Saving Lives Through Administrative Law and Economics*, 157 U. PA. L. REV. 395, 503 (2008); SUNSTEIN, *supra* note 14, at 226.

[28] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34; John D. Graham et al., *Managing the Regulatory State: The Experience of the Bush Administration*, 33 FORDHAM URB. L.J. 953, 991 (2006).

[29] The rationales for discounting health, safety and environmental benefits cited by OMB in its latest methodological guidelines are opportunity cost (*see infra* Part II), the necessity of avoiding paradoxical results (*see infra* Part I), declining marginal utility (*see infra* Part III), and pure time preference. OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 31–36. The discussion of these rationales in this paper is generally limited to a consideration of whether or not they should be understood to prohibit differential discounting. Note that pure time preference and declining marginal utility, while relevant to a discussion of what the discount rates for health and environmental goods should be, are not relevant to the debate over whether the rates used for these goods must always be precisely equal to whatever rate is used for money. For a more complete discussion of the various rationales for discounting, *see* Richard L. Revesz & Matthew R. Shahabian, *Climate Change and Future Generations*, 84 S. CAL. L. REV. 1097 (2011).

[30] As used in this paper, "differential discounting" means discounting where the rate used for benefits is less than the rate used for costs within the same analysis; discounting where the rate for benefits is *greater* than the rate for costs, while theoretically possible, is beyond the scope of this paper.

and (2) are not issued pursuant to any statutory or judicial deadline. A review of recently proposed rules reveals that differential discounting would not perpetually delay any real-world regulations.

Part II addresses various incarnations of the opportunity cost argument for equal discounting, arguing that each errs in including chimerical "opportunities" in their calculations of the opportunity costs of regulating. And while the opportunity costs of any alternative investments *actually* displaced by regulations may be relevant considerations for regulators, the arguments—premised in opportunity cost—that logic compels equal discounting of regulatory costs and benefits all fail.

Having untethered the discount rate for health and environmental goods from the monetary rate, this article next examines the strong evidence that the values of health and environmental benefits are not depreciating as quickly as money, or, in some cases, at all, and that any discount rate used for health and environmental goods should be significantly lower than the rate used for money within the same cost-benefit analysis. Much of this evidence comes from the health economics literature. Perhaps because they mostly work in cost-*effectiveness* analysis,[31] (as opposed to CBA), their work has often been ignored by the law review literature on CBA discounting. However, the question of the rate at which these benefits become more or less valuable depending on when in time they will occur is relevant to both disciplines, and the CBA debate on discounting has much to gain from better understanding the relevant work of health economists.

I. THE PARALYZING PARADOX AND INFINITE DELAY

The OMB Guidelines direct the executive agencies to use the same discount rate for health and environmental benefits as for monetary costs in their CBAs, "in order to avoid well-documented perversities."[32] And chief among these "perversities" is the Keeler-Cretin paradox, summarized here by former OIRA administrator John Graham:

> The paradox of delayed lifesaving, also named the "Keeler-Cretin paradox," starts with the seemingly innocuous assumption that the analyst assigns a lower discount rate (possibly zero) to lives saved than is assigned to dollars. But then the analyst is asked to compare a promising lifesaving rule to the same rule delayed for a year. Under certain conditions, Keeler and Cretin show that the rule is a better investment if it

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[31] Cost-effectiveness analysis generates ratios showing how competing programs compare with each other; in cost-effectiveness analysis (unlike CBA), either the costs or the benefits are fixed. *See* Eric A. Posner, *Transfer Regulations and Cost-Effectiveness Analysis*, 53 DUKE L.J. 1067, 1080 (2003). CBA, on the other hand, is used to generate a dollar amount that represents the net societal benefits (or costs) of an individual proposal; unlike cost-effectiveness analysis, CBA requires monetization of all the goods considered in the analysis. OMB, REGULATORY ANALYSIS, *supra* note 9, at 9–12.

[32] John D. Graham, *Valuing the Future: OMB's Refined Position*, 74 U. CHI. L. REV. 51, 52 (2007)*; and see* OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34.

> is delayed because future lives saved have been discounted at a lower rate than future costs. By the same logic, it can be shown that the lifesaving regulation should be delayed indefinitely, which Keeler and Cretin argue is perverse.[33]

Though Graham—who was head of OIRA when the current guidelines on CBA were released in 2003—uses the "under certain conditions" qualifier above, elsewhere he has omitted it, arguing, without reservation, that the paradox constrains agency analysts from ever using differential discounting in a CBA. For example, in 2006, he stated: "The following paradox results from applying a smaller annual rate of discount to benefits than to costs: delaying an investment that saves lives in the future will *always* be desirable if the analyst is permitted to assign a smaller discount rate to future benefits than to costs."[34]

This "paralyzing paradox" was first described in 1982 and 1983, when Emmett Keeler and Shan Cretin published papers that purported to show that, when costs are discounted and benefits are not, policymakers relying on cost-effectiveness analysis will never start a program, because "[f]or any attractive program, there is always a superior delayed program that should be funded first."[35] And, when a positive, nonzero discount rate is used for benefits, but benefits are discounted at a lower discount rate than costs, Keeler and Cretin find that "a program can only be funded if the set of programs under consideration has sharply decreasing returns."[36] Otherwise, if the programs under consideration have increasing or steady-state benefits (or even slowly decreasing benefits), there will always be a more attractive future program that should be prioritized over any current program, and the decision maker will never be able to start anything.[37] In sum, Keeler and Cretin find that using a positive, but lower, discount rate for benefits would lead to the paralyzing paradox whenever the programs under consideration do not have sharply decreasing returns (which is to say, it would almost always lead to the paralyzing paradox), while using a 0% discount rate for benefits would always paralyze the decision maker.

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[33] Graham, *supra* note 27, at 505.

[34] Graham et al., *supra* note 28, at 991 (emphasis added); *see also*, Richard Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 988–89 (1999) (quoting Susan W. Putnam & John D. Graham, *Chemicals Versus Microbials in Drinking Water: A Decision Sciences Perspective*, 85 J. AM. WATER WORKS ASS'N 57, 60 (1993) ("If a smaller discount rate were to be applied to health than to money, it would always make sense to postpone adoption of public health programs that invest money now for deferred health improvements. In short, society would continually delay risk reduction into the future and impose the burdens on future generations.")).

[35] Emmett B. Keeler & Shan Cretin, *Discounting of Life-Saving and Other Nonmonetary Effects*, 29 MGMT. SCI. 300, 303 (1983).

[36] EMMETT B. KEELER & SHAN CRETIN, DISCOUNTING OF NONMONETARY EFFECTS, THE RAND CORPORATION, N-1875-HHS, at 5 (June 1982).

[37] *See id.*

While Keeler and Cretin's inquiry focused on cost-effectiveness analysis, their conclusions have come to be understood as applying with equal force to CBA.[38] The Keeler-Cretin paradox has been very influential among legal scholars who endorse CBA as a decision-making tool. For example, according to Sunstein and co-author Arden Rowell, the Keeler-Cretin claim that "regulators will never enact programs if they discount costs but not benefits . . . is one of the logical implications of refusing to discount, and the fact that it entails a politically unacceptable outcome does not mean that it is wrong."[39]

And more than a decade of criticism, from both the economics literature and the legal academy, has not diminished the influence of the Keeler-Cretin paradox. On the law side, Lisa Heinzerling and Frank Ackerman challenge what they see as an implicit assumption of economic inefficiency—if all programs under consideration are cost-effective, they argue, all should be financed, regardless of whether a future program has greater net benefits than a current one; Heinzerling and Ackerman also argue that even if failing to discount did mean net benefits would always increase whenever regulations were delayed, real-world political pressure would prevent decision makers from ever becoming paralyzed by this phenomenon.[40] Richard Revesz argues that, contrary to the necessary Keeler-Cretin assumption that delaying a program will not increase its undiscounted costs, delaying a regulation is likely to increase its price, especially in the environmental arena, where unaddressed problems tend to worsen over time;[41] he also argues that, as a practical matter, resources cannot be transferred across projects as readily as Keeler and Cretin seem to assume.[42] Current OIRA Administrator Cass Sunstein and former administrator John Graham have found the arguments of Revesz, Ackerman and Heinzerling unpersuasive; Sunstein and Graham both respond similarly, arguing that discounting's critics within the legal academy have failed to deny the basic logic of the paradox, which, they

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38 *See, e.g.*, Graham, *supra* note 32, at 52 n. 7.

39 Sunstein & Rowell, *supra* note 18, at 176 n. 24, 198. According to Frank Ackerman and Lisa Heinzerling, "current advocates of discounting increasingly point to the Keeler-Cretin Paradox as their last best defense." FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 192 (2004); *see also The Regulators Best Friend?*, THE ECONOMIST, April 2, 2005, at 72 ("If regulators discounted costs but not lives saved, they would defer action indefinitely, [Robert] Hahn points out.").

40 ACKERMAN & HEINZERLING, *supra* note 39, at 192–93; *see also* Lisa Heinzerling, *Discounting Our Future*, 34 LAND & WATER L. REV. 39, 40–41 (1999).

41 Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives*, 99 COLUM. L. REV. 941, 990 (1999); *see also* Revesz & Shahabian, *supra* note 29.

42 *Id.* at 989–92.

conclude, continues to offer compelling justification for equal discounting.[43]

(Note that in their scholarship describing the paradox, Revesz and Ackerman/Heinzerling attribute to Keeler and Cretin an "opportunity cost" argument they did not actually make, i.e., that any money not immediately spent on regulation could be invested and made to grow.[44] The Keeler-Cretin perpetual delay phenomenon is not driven by any investment of unspent funds; to the contrary, Keeler and Cretin assume the funds will *not* be invested during the delay. Instead, the Keeler-Cretin paradox is driven by the change in present value that occurs *from delay alone*, when the discount rate for benefits is smaller than the rate used for costs, and a regulatory program is delayed. (The relevance—to the differential discounting debate—of the possibility that funds not spent on regulation could be invested and made to grow during the period of delay is discussed at length *infra* Part II.))

Economists, too, have attacked numerous Keeler-Cretin assumptions, which they argue fail to correlate with the real-world programs typically evaluated under cost-effectiveness analysis.[45] For example, economist Ben A. Van Hout showed that no paradox will occur in cost-effectiveness

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[43] Graham, *supra* note 27, at 505 n. 478; Sunstein & Rowell, *supra* note 18, at 176 n. 24, 198 (discussing critiques by Revesz and Ackerman/Heinzerling, then citing Keeler and Cretin in support of the argument that one problem with refusing to discount is "if the refusal to discount will result in the postponement of protective programs, environmental and otherwise, the future is to that extent hurt rather than helped.").

[44] From Revesz:

> [A]ccording to Emmett Keeler and Shan Cretin: 'The discounting of costs but not benefits . . . has a paralyzing effect on a decisionmaker. . . . For any attractive program, there is always a superior delayed program which should be funded first. The result is that no program with a finite starting date can be selected.' The idea behind this position is that, instead of undertaking the environmental program, *one could invest the funds in an alternative project, watch the investment grow*, and then address the environmental problem at some time in the future. At this future time, moreover, one would engage in the same calculus and decide to postpone the environmental expenditure once more.

Revesz, *supra* note 41, at 989 (citation omitted, emphasis added). *Priceless* provides a conceptually similar description of the paradox:

> Suppose that monetary costs are discounted, but health and environmental benefits are not. Suppose, also, that any number of human lives can be saved at a fixed cost per life at any time. Then, at a discount rate of 7 percent, we could either save 100 lives now, or put the money in the bank and have enough to save 107 lives next year. Since the saved lives are not discounted, this delay increases the value of the benefits to society by 7 percent, and should be preferred over the immediate life-saving expenditure. But the same logic shows that it is even better to leave the money in the bank for two years and then save 114 lives, and so on; it will always be better to wait another year.

ACKERMAN & HEINZERLING, *supra* note 39, at 227.

[45] For a survey of these arguments, *see* Angelina Lazaro, *Theoretical Arguments for the Discounting of Health Consequences*, 20 PHARMACOECONOMICS 943, 950–51 (2002); *see also* Hugh Gravelle et al., *Discounting in Economic Evaluations: Stepping Forward Towards Optimal Decision Rules*, 16 HEALTH ECON. 307 (2007).

analysis when the programs under consideration are assumed to continue indefinitely.[46] However, Van Hout's argument, and the arguments of other economists who have criticized the Keeler-Cretin paradox, has failed to gain any traction in the law review literature and in OIRA.[47] Perhaps this is because the health economics literature generally discusses differential discounting in the context of cost-*effectiveness* analysis, which is related to CBA but different in several important ways,[48] and it is not always immediately clear which conclusions from the literature on cost-effectiveness analysis are transferable to CBA.

This part will argue that the Keeler-Cretin paradox is not a legitimate barrier to differential discounting in federal executive agency CBAs, and will use examples to show that the argument that differential discounting would always point regulatory decision makers toward perpetual delay of cost-beneficial regulations does not hold up. The conclusion that differential discounting in agency CBAs would not perpetually delay cost-beneficial regulations holds, regardless of whether the regulation is assumed to continue indefinitely, and regardless of whether benefits are even discounted at all. In short, differential discounting will not direct decision makers perpetually to delay cost-beneficial regulations.

A. CBA OVER AN INFINITE TIME HORIZON

Imagine a lifesaving regulation that requires $40 million in initial capital costs and other costs this year, but causes no benefits this year. After this year, total (monetary) costs will be $20 million per year, health benefits will be $24 million per year,[49] and those cost and benefit streams will continue indefinitely.[50] Assume the discount rate for costs is 3%, and the discount rate for benefits is 1.5%.

The formula for calculating the present value of a perpetuity is:

$$PV = \frac{annual\ payment}{interest\ rate}$$

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[46] Ben A. Van Hout, *Discounting Costs and Effects: A Reconsideration*, 7 HEALTH ECON. 581 (1998); *see also* Hugh Gravelle & Dave Smith, *Discounting for Health Effects in Cost-Benefit and Cost-Effectiveness Analysis*, 10 HEALTH ECON. 587, 592–93 (2001).

[47] Revesz's work is an exception. *See* Revesz, *supra* note 41, at 944 n.5.

[48] *See supra* note 31 for a discussion of the differences between cost-effectiveness analysis and CBA.

[49] Or three lives saved per year, if the value of a statistical life is $8,000,000 in 2011.

[50] This subpart assumes, like Van Hout, that the program under evaluation will continue for infinity. The application of this assumption to the sample program considered here differs significantly from Van Hout's analysis, however, because Van Hout addressed the Keeler-Cretin paradox in the context of cost-effectiveness analysis, which compares the cost-effectiveness of competing programs against each other, generally without monetizing health benefits. *See* Van Hout, *supra* note 46, at 585–86; *see also supra* note 31 for a discussion of the differences between cost-effectiveness analysis and CBA.

The present value of the total costs of the regulation will be equal to the present value of the continuous stream of costs, $\frac{\$20M}{.03}$, plus the value of the extra $20M in first year start-up costs, or:

$$\frac{\$20M}{.03} + \$20M = \$687M^{51}$$

The present value of the total benefits of the regulation will be equal to the present value of the continuous stream of benefits minus $24M (this adjustment is necessary because no benefits are obtained the first year), or:

$$\frac{\$24M}{.015} - \$24M = \$1576M$$

The net present value (NPV) of the regulation equals the present value of the total benefits minus the present value of the total costs:

$$\$1576M - \$687M = \$889M$$

Next, assume the same regulation is delayed one year. The present value of the regulation's total costs will now be equal to the present value of the annual $20M cost stream, minus $20M (this subtraction from the present value of the continuous cost stream is necessary to adjust for the fact that there will be no costs this year), plus the present value of the extra $20M in start-up costs that will be paid a year from now,[52] or:

$$\frac{\$20M}{.03} - \$20M + \frac{\$20M}{(1+.03)^1} = \$666M$$

The present value of all benefits will now be equal to the present value of the perpetual $24M stream of benefits, minus $24M (because there will be no benefits this year), and minus the discounted value of the $24M in benefits that will not be received next year, either, or:

$$\frac{\$24M}{.015} - \$24M - \frac{\$24M}{(1+.015)^1} = \$1552M$$

Thus, the NPV of the regulation, delayed by one year, is $886M, which is $3M *less* than the net benefits that would be obtained if the regulation were implemented immediately. And if the regulation is delayed by yet another year, its NPV will be still smaller:

$$\left(\frac{\$24M}{.015} - \$24M - \frac{\$24M}{(1+.015)^1} - \frac{\$24M}{(1+.015)^2}\right) - \left(\frac{\$20M}{.03} - \$20M - \frac{\$20M}{(1+.03)^1} + \frac{\$20M}{(1+.03)^2}\right) = \$883M$$

Thus, when benefits are discounted at a lower rate than costs, delaying the regulation will not necessarily yield higher net benefits in a CBA. *The argument, based on the work of Keeler and Cretin, that using a lower rate to discount benefits than the rate used for costs in a CBA will always point decision makers toward perpetually postponing beneficial regulations, is wrong.*

What happens to the NPV analysis if benefits are not discounted at all? Because the costs *are* discounted, the costs will always resolve to a finite

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51 Rounded to the nearest million.

52 The present value of a single receipt or payment of a future benefit (or cost) equals $\frac{\text{amount of benefit (or cost)}}{(1+\text{discount rate})^{\text{number of years from the present}}}$.

number; however, if a discount rate of zero is used for benefits, then the value of the continuous stream of benefits will be infinite. Subtracting finite costs (no matter what they are) from infinite benefits will always yield net benefits of infinity. So, using zero discounting for benefits (but not costs), the regulation's NPV will always be equal to infinity, no matter when the regulation begins.

This indeterminate result is not particularly helpful to the regulatory decision maker who is trying to determine the optimal time to start a regulation (an issue discussed below), but it is also not the "perverse" result that has been repeated and repeated in the literature, namely, that "[f]or any attractive program, there is always a superior delayed program which should be funded first."[53] Instead, when only costs are discounted, and programs are examined over an infinite time horizon, delaying a program with a continuous, positive benefits stream will not influence net benefits one way or the other.

B. FROM ZERO TO INFINITY

The net present value of a stable benefit stream over an infinite time horizon is equal to infinity if no discounting of benefits is done, while costs, no matter how large, will be finite if any discount rate is used for costs. So, even a regulation that costs $10 million annually, but only prevents, on average, one headache per year (with no other benefits) will always produce positive "net benefits" in a CBA if benefits are not discounted and any positive, nonzero discount rate is used for costs. In the real world, agencies simply do not waste their energy on regulations with such trivial benefits and such substantial costs, but this problem is a logical implication of using a zero discount rate, and has salience for some commentators.[54]

The legal scholars who make the case for zero discounting of intangible regulatory benefits do not argue that any cost, no matter how great, is sufficient to justify any ongoing regulatory benefit, no matter how small, even though this conclusion might seem logically to follow from a refusal to discount benefits in a cost-benefit analysis. Instead, discounting's skeptics argue that CBA is a poor decision-making tool, one that obfuscates

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[53] Keeler & Cretin, *supra* note 35, at 303.

[54] *E.g.*, W. Kip Viscusi, *Rational Discounting for Regulatory Analysis*, 74 U. CHI. L. REV. 209, 216–17 (2007) ("The first problem [with refusing to discount benefits] is what I have called the 'permanent cost slam dunk.' Suppose that a development policy will lead to the permanent loss of some very inconsequential environmental amenity that has a value of $1 in each period. With that loss extended for an infinite time horizon, the present value of the environmental harm is infinite. No policy criterion with a finite payoff can ever offer great enough benefits to offset this infinite loss. In contrast, with discounting, the infinite stream of $1 losses has a present value of only 1/r, or $33 with a three percent discount rate.") (citation omitted).

more than it clarifies, and one that should be abandoned.[55] Alternatives to conventional CBA, which would present relevant data in an analytical framework that lays out the costs and the benefits of different regulatory options over time, with quantification but not monetization of intangible goods, and without discounting of intangibles, have been offered.[56]

With that understanding, I will now consider how a hypothetical agency analyst who is absolutely committed to using a zero discount rate within the context of an otherwise conventional CBA might address the "infinite benefits" objection. There are several possibilities: (1) arbitrarily choose a finite appraisal period, e.g., ten years, or fifty years, or five hundred years (this option would run afoul of OIRA's current—and rarely followed—directive to look at a time period long enough to capture most of the rule's costs and benefits,[57] since a zero percent discount rate means the uncaptured regulatory benefits at any point in time will always be greater that the benefits captured in the analysis); (2) use a very, very small discount rate for benefits (e.g., 0.001%); or (3) make the time horizon finite by identifying a date in the future when the regulation will probably stop generating any benefits or costs (e.g., the regulation relates to public notice that must be given before certain activities related to mountaintop removal coal mining are undertaken, and we estimate all coal removable by this method will be gone by year x).

This third option holds some promise.

Many regulations are wonderfully beneficial, and it seems reasonable to say that, for example, the U.S. ban on DDT (which tends to persist in the environment and does great damage to wildlife, and famously brought the peregrine falcon to the very edge of extinction) will bring benefits forever. But will it? Experts predict that about a billion years from now, as the sun moves toward becoming a red giant, the Earth will be too hot to support life of any kind.[58] This would seem to place an extreme outside limit on the length of time any regulation will generate benefits and costs.

And other events will cause regulations to become obsolete far sooner than one billion years from now: technology will change, our climate will change, consumer populations and preferences will change, and non-renewable natural resources will be depleted. And so, for example,

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55 *See, e.g.*, McGarity, *supra* note 9; ACKERMAN & HEINZERLING, *supra* note 39.

56 *See* Sidney A. Shapiro & Christopher H. Schroeder, *Beyond Cost-Benefit Analysis: A Pragmatic Reorientation*, 32 HARV. ENVTL. L. REV. 433 (2008); *see also* ACKERMAN & HEINZERLING, *supra* note 39, at 210–15.

57 OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 15 ("The time frame for your analysis should cover a period long enough to encompass all the important benefits and costs likely to result from the rule.").

58 Jeff Hecht, *Moving the Earth: A Planetary Survival Guide*, NEW SCIENTIST, Oct. 20, 2008, *available at* http://www.newscientist.com/article/dn14983-moving-the-earth-a-planetary-survival-guide.html?full=true; *Sun Will Vaporize Earth Unless We Can Change Our Orbit*, SCIENCE DAILY, Feb. 24, 2008, *available at* http://www.sciencedaily.com/releases/2008/02/080223130020.htm.

regulations governing tobacco price supports became obsolete after Congress ended the program.[59] A regulatory requirement that had been designed, in 1953, to ensure that clothing's flame retardancy was maintained under a then-current dry cleaning method became obsolete after the EPA banned that method of dry cleaning.[60] One day, vehicles will likely be powered by something other than petroleum products, because we will run out of oil, or, as petroleum supplies dwindle, petroleum-derived fuels will become more expensive than other fuel options, making the National Highway Traffic Safety Administration's fuel economy standards irrelevant; and so on. Even the best regulation will someday become obsolete, and, at some point before infinity, all regulations will stop generating costs and benefits.

The key point, in the context of examining the Keeler-Cretin paradox, is that these end points are not written into the regulations; in general, regulations don't have built-in expiration dates that are tied to their effective dates.[61] An agency analyst comparing the net benefits of regulating now with the net benefits of regulating a year from now should consider whether the regulation has a built-in expiration date, and if it does, whether delaying the regulation a year will mean the regulation will be in effect for one year fewer, or whether delaying the regulation will instead mean the same regulatory costs and benefits will be experienced for exactly the same length of time, just delayed a year.

If a regulation's provisions will be renewable or (as is far more likely) continuous, then an analyst who is evaluating a regulation over a finite time horizon should assume that delaying the regulation one year will mean one fewer year that the regulation is in effect, because forces other than the effective date of the regulation (such as the U.S. running out of near-surface coal) are more likely than the exact timing of its effective date to cause the regulation to stop providing any costs or benefits.

C. CBA OVER A FINITE PERIOD

Keeler and Cretin assumed that the program under analysis would last for a finite period, and that delaying the program wouldn't reduce its benefits at all, but would only delay them. But that is not how regulations work. Instead, the general rule is that delaying a regulation by a year means there will be one fewer year of the regulation.

It is possible to imagine a regulatory program that is set up to 'self-destruct' exactly a year (or ten years, or twenty years, or five hundred years) after it first begins to generate benefits or costs. But this is not the paradigmatic case. Instead, this condition, this necessary Keeler-Cretin

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[59] Dept. of Agriculture, Tobacco Transition Payment Program, 7 C.F.R. § 1463 (2005).

[60] Consumer Prod. Safety Comm'n, Standard for the Flammability of Clothing Textiles, 16 C.F.R. § 1610 (2008).

[61] *See infra* note 62.

assumption that delaying the regulation would not diminish its undiscounted benefits in any way, will almost never be satisfied by federal executive agency regulations (i.e., the regulations that are analyzed under OIRA's methodological guidelines, which forbid differential discounting).

A review, completed in July and August 2010, of all fifteen economically significant rules under EO 12866 review at OIRA on the day the sample was drawn (July 23, 2010), found that none included expiration dates.[62] All of these rules were designed to establish ongoing programs, standards, or policies. None were set up to self-destruct a fixed time period after going into effect. (Six of them have additional ammunition against perpetual delay, in that—according to OIRA—Congress or the courts have provided a deadline by which the agency must regulate.)

Tables 1 and 2 illustrate what might happen to the NPV of an ongoing, lifesaving regulation under differential discounting when the regulation is delayed one year. For this hypothetical regulation, costs are $10M, $8M, $5M, and $2M in the first four years, respectively, and $1M each subsequent year. Benefits are $0.50M, $1.0M, and $1.5M in the first four years, respectively, and $2M each subsequent year. In Table 1, costs are discounted at a 3% rate, while benefits are not discounted at all; in Table 2, costs are again discounted at a 3% rate, but benefits are discounted at a rate of 1.5%.

[62] Following are all of the regulations (arranged by agency and RIN) under EO 12866 review at OIRA on July 23, 2010, according to www.reginfo.gov. Department of Agriculture: RIN 0583-AD36; Department of Defense: RIN 0720-AB45, RIN 0790-AI50; Department of Health and Human Services: RIN 0920-AA12, RIN 0920-AA22, RIN 0938-AP57; Department of Homeland Security: RIN 1651-AA83; Department of Justice: RIN 1190-AA44, RIN 1190-AA46; Department of Labor: RIN 1210-AB07; Department of Transportation: RIN 2125-AF19,RIN 2130-AC03; Department of Veterans Affairs: RIN 2900-AN54; Environmental Protection Agency: RIN 2060-AQ13, RIN 2060-AO15.

Table 1: Immediate Implementation of Rule vs. Rule Delayed One Year (Costs Discounted at 3%, Undiscounted Benefits)

	Immediate Implementation of Rule (Millions)			*Rule Delayed One Year (Millions)*		
Year	**Undiscounted Costs**	**Costs in 2011 dollars (r=3%)**	**Undiscounted Benefits**	**Undiscounted Costs**	**Costs in 2011 dollars (r=3%)**	**Undiscounted Benefits**
2011	$ 10.00	$ 10.00	$ 0.50	$ -	$ -	$ -
2012	$ 8.00	$ 7.76	$ 1.00	$ 10.00	$ 9.70	$ 0.50
2013	$ 5.00	$ 4.70	$ 1.50	$ 8.00	$ 7.53	$ 1.00
2014	$ 2.00	$ 1.83	$ 2.00	$ 5.00	$ 4.56	$ 1.50
2015	$ 1.00	$ 0.89	$ 2.00	$ 2.00	$ 1.77	$ 2.00
2016	$ 1.00	$ 0.86	$ 2.00	$ 1.00	$ 0.86	$ 2.00
2017	$ 1.00	$ 0.83	$ 2.00	$ 1.00	$ 0.83	$ 2.00
2018	$ 1.00	$ 0.81	$ 2.00	$ 1.00	$ 0.81	$ 2.00
2019	$ 1.00	$ 0.78	$ 2.00	$ 1.00	$ 0.78	$ 2.00
2020	$ 1.00	$ 0.76	$ 2.00	$ 1.00	$ 0.76	$ 2.00
2021	$ 1.00	$ 0.74	$ 2.00	$ 1.00	$ 0.74	$ 2.00
2022	$ 1.00	$ 0.72	$ 2.00	$ 1.00	$ 0.72	$ 2.00
2023	$ 1.00	$ 0.69	$ 2.00	$ 1.00	$ 0.69	$ 2.00
2024	$ 1.00	$ 0.67	$ 2.00	$ 1.00	$ 0.67	$ 2.00
2025	$ 1.00	$ 0.65	$ 2.00	$ 1.00	$ 0.65	$ 2.00
2026	$ 1.00	$ 0.63	$ 2.00	$ 1.00	$ 0.63	$ 2.00
2027	$ 1.00	$ 0.61	$ 2.00	$ 1.00	$ 0.61	$ 2.00
2028	$ 1.00	$ 0.60	$ 2.00	$ 1.00	$ 0.60	$ 2.00
2029	$ 1.00	$ 0.58	$ 2.00	$ 1.00	$ 0.58	$ 2.00
2030	$ 1.00	$ 0.56	$ 2.00	$ 1.00	$ 0.56	$ 2.00
2031	$ 1.00	$ 0.54	$ 2.00	$ 1.00	$ 0.54	$ 2.00
2032	$ 1.00	$ 0.53	$ 2.00	$ 1.00	$ 0.53	$ 2.00
2033	$ 1.00	$ 0.51	$ 2.00	$ 1.00	$ 0.51	$ 2.00
2034	$ 1.00	$ 0.50	$ 2.00	$ 1.00	$ 0.50	$ 2.00
2035	$ 1.00	$ 0.48	$ 2.00	$ 1.00	$ 0.48	$ 2.00
2036	$ 1.00	$ 0.47	$ 2.00	$ 1.00	$ 0.47	$ 2.00
2037	$ 1.00	$ 0.45	$ 2.00	$ 1.00	$ 0.45	$ 2.00
2038	$ 1.00	$ 0.44	$ 2.00	$ 1.00	$ 0.44	$ 2.00
2039	$ 1.00	$ 0.43	$ 2.00	$ 1.00	$ 0.43	$ 2.00
2040	$ 1.00	$ 0.41	$ 2.00	$ 1.00	$ 0.41	$ 2.00
2041	$ 1.00	$ 0.40	$ 2.00	$ 1.00	$ 0.40	$ 2.00
2042	$ 1.00	$ 0.39	$ 2.00	$ 1.00	$ 0.39	$ 2.00
2043	$ 1.00	$ 0.38	$ 2.00	$ 1.00	$ 0.38	$ 2.00
2044	$ 1.00	$ 0.37	$ 2.00	$ 1.00	$ 0.37	$ 2.00
2045	$ 1.00	$ 0.36	$ 2.00	$ 1.00	$ 0.36	$ 2.00
2046	$ 1.00	$ 0.34	$ 2.00	$ 1.00	$ 0.34	$ 2.00
2047	$ 1.00	$ 0.33	$ 2.00	$ 1.00	$ 0.33	$ 2.00
2048	$ 1.00	$ 0.32	$ 2.00	$ 1.00	$ 0.32	$ 2.00
2049	$ 1.00	$ 0.31	$ 2.00	$ 1.00	$ 0.31	$ 2.00
2050	$ 1.00	$ 0.30	$ 2.00	$ 1.00	$ 0.30	$ 2.00
Total		**$ 43.94**	**$ 77.00**		**$ 42.33**	**$ 75.00**
Net Benefits	***$ 33.06***			***$ 32.67***		

Table 2: Immediate Implementation of Rule vs. Rule Delayed One Year (Benefits Discounted at 1.5%, Costs Discounted at 3%)

	Immediate Implementation of Rule (Millions)				*Rule Delayed One Year (Millions)*			
Year	**Un-discounted Costs**	**Costs in 2011 dollars (r=3%)**	**Un-discounted Benefits**	**Benefits in 2011 dollars (r=1.5%)**	**Un-discounted Costs**	**Costs in 2011 dollars (r=3%)**	**Un-discounted Benefits**	**Benefits in 2011 dollars (r=1.5%)**
2011	$ 10.00	$ 10.00	$ 0.50	$ 0.50	$ -	$ -	$ -	$ -
2012	$ 8.00	$ 7.76	$ 1.00	$ 0.99	$ 10.00	$ 9.70	$ 0.50	$ 0.49
2013	$ 5.00	$ 4.70	$ 1.50	$ 1.46	$ 8.00	$ 7.53	$ 1.00	$ 0.97
2014	$ 2.00	$ 1.83	$ 2.00	$ 1.91	$ 5.00	$ 4.56	$ 1.50	$ 1.43
2015	$ 1.00	$ 0.89	$ 2.00	$ 1.88	$ 2.00	$ 1.77	$ 2.00	$ 1.88
2016	$ 1.00	$ 0.86	$ 2.00	$ 1.85	$ 1.00	$ 0.86	$ 2.00	$ 1.85
2017	$ 1.00	$ 0.83	$ 2.00	$ 1.83	$ 1.00	$ 0.83	$ 2.00	$ 1.83
2018	$ 1.00	$ 0.81	$ 2.00	$ 1.80	$ 1.00	$ 0.81	$ 2.00	$ 1.80
2019	$ 1.00	$ 0.78	$ 2.00	$ 1.77	$ 1.00	$ 0.78	$ 2.00	$ 1.77
2020	$ 1.00	$ 0.76	$ 2.00	$ 1.75	$ 1.00	$ 0.76	$ 2.00	$ 1.75
2021	$ 1.00	$ 0.74	$ 2.00	$ 1.72	$ 1.00	$ 0.74	$ 2.00	$ 1.72
2022	$ 1.00	$ 0.72	$ 2.00	$ 1.69	$ 1.00	$ 0.72	$ 2.00	$ 1.69
2023	$ 1.00	$ 0.69	$ 2.00	$ 1.67	$ 1.00	$ 0.69	$ 2.00	$ 1.67
2024	$ 1.00	$ 0.67	$ 2.00	$ 1.64	$ 1.00	$ 0.67	$ 2.00	$ 1.64
2025	$ 1.00	$ 0.65	$ 2.00	$ 1.62	$ 1.00	$ 0.65	$ 2.00	$ 1.62
2026	$ 1.00	$ 0.63	$ 2.00	$ 1.59	$ 1.00	$ 0.63	$ 2.00	$ 1.59
2027	$ 1.00	$ 0.61	$ 2.00	$ 1.57	$ 1.00	$ 0.61	$ 2.00	$ 1.57
2028	$ 1.00	$ 0.60	$ 2.00	$ 1.55	$ 1.00	$ 0.60	$ 2.00	$ 1.55
2029	$ 1.00	$ 0.58	$ 2.00	$ 1.52	$ 1.00	$ 0.58	$ 2.00	$ 1.52
2030	$ 1.00	$ 0.56	$ 2.00	$ 1.50	$ 1.00	$ 0.56	$ 2.00	$ 1.50
2031	$ 1.00	$ 0.54	$ 2.00	$ 1.48	$ 1.00	$ 0.54	$ 2.00	$ 1.48
2032	$ 1.00	$ 0.53	$ 2.00	$ 1.46	$ 1.00	$ 0.53	$ 2.00	$ 1.46
2033	$ 1.00	$ 0.51	$ 2.00	$ 1.43	$ 1.00	$ 0.51	$ 2.00	$ 1.43
2034	$ 1.00	$ 0.50	$ 2.00	$ 1.41	$ 1.00	$ 0.50	$ 2.00	$ 1.41
2035	$ 1.00	$ 0.48	$ 2.00	$ 1.39	$ 1.00	$ 0.48	$ 2.00	$ 1.39
2036	$ 1.00	$ 0.47	$ 2.00	$ 1.37	$ 1.00	$ 0.47	$ 2.00	$ 1.37
2037	$ 1.00	$ 0.45	$ 2.00	$ 1.35	$ 1.00	$ 0.45	$ 2.00	$ 1.35
2038	$ 1.00	$ 0.44	$ 2.00	$ 1.33	$ 1.00	$ 0.44	$ 2.00	$ 1.33
2039	$ 1.00	$ 0.43	$ 2.00	$ 1.31	$ 1.00	$ 0.43	$ 2.00	$ 1.31
2040	$ 1.00	$ 0.41	$ 2.00	$ 1.29	$ 1.00	$ 0.41	$ 2.00	$ 1.29
2041	$ 1.00	$ 0.40	$ 2.00	$ 1.27	$ 1.00	$ 0.40	$ 2.00	$ 1.27
2042	$ 1.00	$ 0.39	$ 2.00	$ 1.25	$ 1.00	$ 0.39	$ 2.00	$ 1.25
2043	$ 1.00	$ 0.38	$ 2.00	$ 1.23	$ 1.00	$ 0.38	$ 2.00	$ 1.23
2044	$ 1.00	$ 0.37	$ 2.00	$ 1.21	$ 1.00	$ 0.37	$ 2.00	$ 1.21
2045	$ 1.00	$ 0.36	$ 2.00	$ 1.20	$ 1.00	$ 0.36	$ 2.00	$ 1.20
2046	$ 1.00	$ 0.34	$ 2.00	$ 1.18	$ 1.00	$ 0.34	$ 2.00	$ 1.18
2047	$ 1.00	$ 0.33	$ 2.00	$ 1.16	$ 1.00	$ 0.33	$ 2.00	$ 1.16
2048	$ 1.00	$ 0.32	$ 2.00	$ 1.14	$ 1.00	$ 0.32	$ 2.00	$ 1.14
2049	$ 1.00	$ 0.31	$ 2.00	$ 1.13	$ 1.00	$ 0.31	$ 2.00	$ 1.13
2050	$ 1.00	$ 0.30	$ 2.00	$ 1.11	$ 1.00	$ 0.30	$ 2.00	$ 1.11
Total		**$ 43.94**		**$ 57.52**		**$ 42.33**		**$ 55.56**
Net Benefits	***$ 13.58***				***$ 13.23***			

As these tables show, delaying this hypothetical lifesaving regulation by one year would reduce—not increase—net benefits when benefits are discounted at 0% (Table 1) or 1.5% (Table 2) and monetary costs are discounted at the higher rate of 3%. Differential discounting, once again, does not point to a delay. When benefits are discounted at 0% (Table 1), delaying the regulation by one year will eliminate an entire year of undiscounted benefits at the stabilized amount of $2 million. When benefits are discounted at 1.5% (Table 2), delaying the regulation one year will eliminate $1.97 million in benefits. In both Table 1 and Table 2, costs, discounted at the 3% annual rate, are reduced by only $1.61 million when the rule is delayed a year—not enough, in either case, to compensate for the benefits foregone when the rule is delayed. Thus, examined now over a finite time horizon, the claim that, when costs are discounted at a higher rate than benefits, postponing regulations will always yield higher net benefits, still does not hold up.

Observe that for this hypothetical regulation, where costs and benefits stabilize over time, the costs and benefits will be the same under either the "regulate now" scenario or the "regulate in one year" scenario for most of the years the regulation will be in effect. In Tables 1 and 2, the benefits and costs each year after the first five years—once the startup costs have been covered and costs and benefits have stabilized—are exactly the same. For the sake of space, these tables only show costs and benefits up to the year 2050. When benefits are discounted at 0% (Table 1), for any point between 2015 and infinity, the NPV of the "regulate now" option will *always* be $390,000[63] more than the "regulate in one year" option. And when benefits are discounted at 1.5%, the NPV of the "regulate now" option will *always* be $350,000[64] more than the "regulate in one year" option, from 2016 onward. No matter what end date is used in either of these CBAs, delaying the regulation will never increase net benefits.

It is possible to conceive of a regulation with high enough upfront costs and low enough upfront benefits that net benefits will be higher under differential discounting if the rule is delayed, especially if a high discount rate is used for costs. Such rules would tend to fail a conventional cost-benefit test that uses equal discounting, but it is possible that some might have positive net benefits under differential discounting. So, it is possible that, under differential discounting, a finite delay might maximize net benefits in some cases. This can happen under equal discounting, too, and this is one reason agencies sometimes compare the net benefits of a regulation under different start dates.[65] That is, earliest implementation

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[63] This number is approximate, due to rounding.

[64] This number is approximate, due to rounding.

[65] *E.g.*, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, FINAL REGULATORY IMPACT ANALYSIS, ELECTRONIC STABILITY CONTROL SYSTEMS, at VII3–VII9 (March 2007).

doesn't always maximize net benefits under either equal or differential discounting. However, cost-beneficial rules would not be *infinitely* delayed. For any rule that will have net benefits at any discrete point in time, and for which ongoing annual benefits will eventually exceed ongoing annual costs, it is possible that a finite delay may increase net benefits; however, since costs are discounted at a higher rate than benefits, the benefits that are foregone by delaying the rule will eventually be greater than the value of postponing the costs an additional year. Any delay will not be infinite.

Choosing a fixed-length appraisal period (e.g., ten years from the date the regulation will first generate costs and benefits) to compare the "regulate now" option with the "regulate next year" option would create a false impression that by delaying the regulation one year, one could typically[66] increase its net benefits under differential discounting.

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[66] But not "always." The principal object of this Part has been to demonstrate that the "perpetual delay" phenomenon observed by Keeler and Cretin absolutely disappears when one assumes (contrary to Keeler and Cretin) that a year of regulatory delay means one fewer year the regulation will generate regulatory costs and benefits. However, it is also worth addressing John Graham's very broad claim that, due to the operation of the Keeler-Cretin paradox, discounting benefits at a lower rate than costs would "always" point decision makers toward perpetual delay of cost-beneficial regulations, as—even if all relevant Keeler-Cretin assumptions are accepted—Graham has overstated the case. If we apply all the relevant Keeler-Cretin assumptions to CBA (Keeler and Cretin worked in cost-effectiveness analysis), and we assume a fixed-length program with exactly *n* years of costs and benefits, and r_b is the annual discount rate for benefits, and r_c is the annual discount rate for costs, then:

$$NPV\ of\ Program = [B_0 + \frac{B_1}{(1+r_b)^1} + \frac{B_2}{(1+r_b)^2} + \cdots + \frac{B_n}{(1+r_b)^n}] - [C_0 + \frac{C_1}{(1+r_c)^1} + \frac{C_2}{(1+r_c)^2} + \cdots + \frac{C_n}{(1+r_c)^n}]$$

where B_0 and C_0 are the costs and benefits this year, and B_1 and C_1 are the costs and benefits next year, and so on. If we assume, like Keeler and Cretin, that delaying the program a year will result in exactly the same annual costs and benefits, each delayed exactly one year, then:

$$NPV\ of\ Program\ Delayed\ a\ Year = [\frac{B_0}{(1+r_b)^1} + \frac{B_1}{(1+r_b)^2} + \cdots + \frac{B_{(n)}}{(1+r_b)^{n+1}}] - [\frac{C_0}{(1+r_c)^1} + \frac{C_1}{(1+r_c)^2} + \cdots + \frac{C_n}{(1+r_c)^{n+1}}]$$

Running regulations with various cost and benefit profiles (rising, falling, static) through these equations, one finds that in cost-benefit analysis (as with cost-effectiveness analysis), when benefits are discounted at a lower rate than costs, delaying the program does not "always" increase the program's present value, even when all Keeler-Cretin assumptions are accepted. (Programs with falling benefits and/or programs with rising costs are particularly likely to become *less* valuable under differential discounting if they are delayed a year, under the Keeler and Cretin assumptions.) While the number of regulations for which differential discounting would not point to perpetual delay, under Keeler and Cretin's highly unrealistic assumptions, may be quite small, that some regulations are theoretically immune does at least contradict Graham's broad claim that, due to the operation of the Keeler-Cretin paradox, if costs are discounted at a lower rate than benefits, a program will "always" appear more cost-beneficial if it is delayed. *See also* Gravelle & Smith, *supra* note 46, at 592–93 (Gravelle and Smith assume a single period project that will be undertaken once only (note that Keeler and Cretin do not specify a "single period" project, although they do assume a project that will last a finite period of time), and that the costs and health effects are the same no matter when the project is undertaken; their analysis shows there are some circumstances, under these assumptions, when CBA with differential discounting will not point to a delay).

Generally, a regulation establishes a continuous policy or program, and the date when the regulation will stop generating costs and benefits is not determined by the effective date of the regulation. Thus, when using CBA to compare net benefits for different effective dates for the same regulation, it is inaccurate and misleading to assume that delaying the regulation will affect neither its undiscounted benefits nor its undiscounted costs. This assumption—necessary to obtain Keeler and Cretin's paradoxical result—that delaying a beneficial regulation will postpone but not otherwise diminish its benefits and costs, is far less likely, at least in the context of agency cost-benefit analysis, than the assumption that delaying the rule a year will mean one fewer year that the regulation will be in effect.

Note that if the regulation were expected to generate costs and benefits indefinitely, then to capture all, or almost all, of the effects of the regulation, the cost-benefit analysis using the 1.5% discount rate for benefits would have to extend for many additional years. Over an infinite time horizon, net benefits of the rule will approach $76.55 million if it goes into effect in 2011 and will approach $76.19 million if it goes into effect in 2012. Table 1, which uses a 0% rate for benefits, obviously does not capture most of the effects of the ongoing, lifesaving regulation, and extending the analysis for additional years would not help, since the value of the uncaptured benefits will always be infinitely large, unless an estimated date is identified when the regulation will stop generating benefits.

But the purpose of this part is not to defend the use of a 0% rate for benefits.[67] While there is a strong case to be made that any discounting of public health and environmental goods in a conventional cost-benefit analysis is inappropriate and unethical, these arguments are generally bound up with the (also strong) case against using conventional cost-benefit analysis as a decision-making tool at all.[68] Instead, the principal aim of this part has been to establish that fear of running afoul of the "Keeler-Cretin paradox" is not a valid reason for OMB to prohibit or discourage differential discounting in agency CBAs.

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[67] Note, however, that there is nothing inherently unreasonable about arguing the monetized values of some resources are increasing such that a *negative* discount rate would be needed to accurately project the value of the resource into the future. A good example of this might be an unpolluted aquifer, if water pollution is expected to increase and unpolluted water is expected to become significantly scarcer. If CBA cannot adequately assess regulations that protect resources whose value is expected to increase very dramatically over time, this would seem to be an indictment of CBA, and not an indictment of the use of negative (or zero) discount rates.

[68] *See* Joseph H. Guth, *Resolving the Paradoxes of Discounting in Environmental Decisions*, 18 TRANSNAT'L L. & CONTEMP. PROBS. 95 (2009).

D. THE TIME-INCONSISTENCY PARADOX

Another common argument against using a lower discount rate for health benefits is the so-called "time-inconsistency paradox"—i.e., differential discounting would violate the assumption that, over time, the "optimal tradeoff between wealth and health" will remain constant.[69] But since, as discussed below, the monetized values of health benefits are expected to grow over time, and the public is expected to become willing to expend more units of "wealth" for the same units of "health," the assumption is wrong anyway, and abandoning it will lead to more accurate analyses than wrongly assuming static monetized values for health benefits.

II. OPPORTUNITY COST RATIONALES FOR EQUAL DISCOUNTING

Two roads diverged in a yellow wood
And sorry I could not travel both
And be one traveler, long I stood…[70]

If you choose not to decide, you still have made a choice.[71]

The concept of "opportunity cost" recognizes that with every human decision comes an often-hidden cost, the loss of the opportunity to take another (possibly better) course of action. For example, imagine I have $10,000 available to invest for exactly one year (at which point I will need to put the money toward a down payment on a house). I may be considering investing in a mutual fund I expect will appreciate at an annual rate of 6%. Another option might be a CD with a 3% annual interest rate. Assume—for the sake of simplicity—these are the only investment options available to me, besides the option of not investing. In this case, the opportunity cost of investing in the CD is $600 (the money I could have earned investing in the mutual fund, the next-best option), while the opportunity cost of investing in the mutual fund is $300 (the money I could have earned investing in the CD). A choice to invest in the CD would certainly seem like a bad decision, since I can expect to earn twice as much by investing in the mutual fund. More formally, the opportunity cost of investing in the CD ($600) exceeds the benefit of investing in the CD ($300), and so, a decision to invest in the CD seems, *prima facie*, irrational.

But what if something constrains me from making the optimal investment? What if, for some reason, I cannot buy the mutual fund (although, perhaps, others still can)? Should I still refrain from buying the CD? Is the "opportunity cost" of buying the CD still $600, or $300 more than I will earn with the CD? Should I leave my money under my mattress if I cannot buy the mutual fund, under the economic theory that one should

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69 Graham, *supra* note 27, at 504–05.

70 Robert Frost, *The Road Not Taken*, *in* ROBERT FROST'S POEMS 219 (Louis Untermeyer ed., 2002) (1915).

71 RUSH, FREEWILL (Mercury Records 1980) (lyrics by Neil Peart).

not take any action for which the opportunity cost exceeds the expected benefits?

The answer, of course, is that I should buy the CD. The value of some better investment outcome *not actually available* for the decision maker to choose is, as a definitional matter, not an opportunity cost. If I can't buy the mutual fund, I am still better off earning $300 with the CD than I would be leaving the money under my mattress.

Note that the choice of doing nothing carries with it an opportunity cost as well. The opportunity cost of leaving the money under my mattress is $600 (if the mutual fund option is available to me) or $300 (if it is not), while the benefit of not investing is $0. In other words, under either scenario, taking no action appears to be an irrational choice, because the benefits ($0) will be less than the opportunity cost ($600 or $300). Under either scenario, taking no action is the worst option.

A failure to apprehend these simple concepts—that the relevant opportunity cost is the expected value of the next-best alternative the decision maker can actually elect (or rationally expects to occur if she fails to make an election), and that "holding out" for a theoretically better but actually unavailable option carries with it an opportunity cost of its own—lies at the heart of the opportunity cost arguments for equal discounting.

Some definitions of opportunity cost are explicit on the point that the opportunity cost of any course of action is the next-best option a decision maker could have chosen.[72] While other definitions are not explicit on this point (the following definition is typical: "Opportunity cost is the value of the best alternative foregone in making any choice"[73]), it is implicit that the relevant next-best alternative to a given choice must be another alternative that the decision maker *actually has the ability to select*. Otherwise, and if the opportunity cost of agency action or inaction were assessed without regard for which outcomes the relevant agency can actually effectuate with its choice, the concept would be completely rootless.[74]

Misunderstanding the "opportunity cost" of regulatory actions in this way, without reference to the set of outcomes actually available for the

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[72] *See, e.g.*, THE NEW PALGRAVE: A DICTIONARY OF ECONOMICS, VOL. 3, 719 (John Eatwell et al., eds. 1987); *see also* Minn. Power and Light v. Hockett, 105 F. Supp. 2d 939, 943 (S.D. Ind. 1999) (holding that, to demonstrate eligibility to recover economic opportunity costs from a plaintiff who obtained a preliminary injunction that was later overturned, the defendant "must show that the preliminary injunction prohibited him from engaging in profitable activities" that his existing contracts with others permitted, and "in which he desired and had the wherewithal to engage.").

[73] TIMOTHY TREGARTHEN & LIBBY RITTENBERG, MICROECONOMICS 5 (2000); *see also* City of Los Angeles v. U.S. Dep't of Trans., 165 F.3d 972 (D.C. Cir 1999) (quoting PAUL A. SAMUELSON & WILLIAM D. NORDHAUS, ECONOMICS 128 (16th ed. 1998) ("A leading economics text defines 'opportunity cost' in this way: 'Making a choice in effect costs us the opportunity to do something else. The alternative forgone is called the opportunity cost. . . .'")).

[74] *See* EATWELL ET AL., *supra* note 72, at 718–20.

agency decision maker to effectuate, makes it worse than useless as a decision criterion. When the best action *actually* available is worse than the best action *theoretically* available under unrealistic assumptions,[75] agencies may often be taking no action when they should be regulating to protect public health and/or the environment.

Although the opportunity costs of any alternative investments actually displaced by regulations are relevant considerations for regulators, the arguments, premised in opportunity cost, that logic compels *equal* discounting of regulatory costs and benefits, are incorrect. And, while opportunity costs (including investment gains foregone) are economic costs, using them as CBA cost inputs will often confound those analyses, and—by essentially raising the baseline—prevent CBAs from measuring what they are meant to measure. (Note that I am not arguing for or against applying a discount rate derived from the "opportunity cost of capital" to regulatory *costs*; that issue is analytically distinct from the issue of whether the economic concept of opportunity cost logically requires equal discounting of costs and benefits in CBAs.)

A. A RESPONSE TO OMB'S OPPORTUNITY COST ARGUMENT FOR EQUAL DISCOUNTING

The OMB Guidelines provide: "It is true that lives saved today cannot be invested in a bank to save more lives in the future. But the resources that would have been used to save those lives can be invested to earn a higher payoff in future lives saved."[76] Opportunity cost is not just used as a rationale for *some* discounting of health and environmental benefits; it is the primary positive rationale for *equal* discounting:

> Investment theory states that any immediate cost represents a foregone investment opportunity. If the immediate cost is deferred, the resulting savings can be invested at a positive rate of return that is defined by the expected inflation-adjusted ("real") rate of interest in the economy. (*The inflation-adjusted rate of interest is also the real discount rate used by analysts when transforming a future cost or benefit into present value*).[77]

According to the OMB Guidelines, should a regulator choose not to regulate, whatever would have been spent on the regulation could instead be "invested to earn a higher payoff in future lives saved."[78] *All* the regulation's social costs represent "foregone investment opportunities." But, again, at the heart of this argument lies a fundamental

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[75] *Cf.* A.K. Sen, *Shadow Prices and Markets*: *Feasibility Constraints*, *in* RICHARD LAYARD & STEPHEN GLAISTER, COST-BENEFIT ANALYSIS 102 (2nd ed. 1994) ("For a project evaluator . . . it is important to know which variables are within his control and to what extent, and in this respect a feeling of oneness with the totality of the government may not be very useful.").

[76] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34.

[77] Graham et al., *supra* note 28, at 990 (citation omitted, emphasis added).

[78] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34.

misunderstanding of opportunity cost. The opportunity cost of an agency action or inaction is the value of the next-best alternative *that will actually be foregone* due to the agency's action or inaction.

While the set of foregone alternatives for an agency economist to consider does include the "do nothing" option, of course,[79] it does not—as many commentators have pointed out—include the option of taking the money that would have been spent on regulatory compliance and investing it on the public's behalf.[80] And even if such an option were available to the agency, this still would not justify equal discounting, since (as is explained below), for many regulations the amount by which the benefits figure is reduced in the CBA to account for the "opportunity cost" of foregone investment is actually greater than the amount that would be gained if all regulatory costs *were* invested at the discount rate. Since public health and environmental regulations are generally directed at market failures,[81] large jumps in social welfare as a consequence of regulation should not confound the analysis in this way.

The opportunity cost argument for equal discounting also errs in its assumption that the value of the "next best" alternative should always be included as a cost input in CBA (if fully operationalized, this policy would result in some enormously beneficial regulations being assessed as having "net benefits" of only a penny), and it errs in assuming that, by using CBA to make decisions, one could maximize two distinct variables at once.

1. *Analysts conducting CBAs cannot simultaneously maximize both "net benefits" and the total number of lives saved*

In making the case for equal discounting, the OMB Guidelines make two claims that are fundamentally incompatible, and that are each individually incorrect. The first claim is that equal discounting in CBAs will result in more *lifesaving*. The second is that equal discounting in CBAs will increase social welfare.[82]

The two claims are incompatible with each other, as "it is not mathematically possible to maximize for two (or more) variables at the same time."[83] We cannot make a decision that maximizes "net benefits" (as calculated in a CBA), whilst simultaneously maximizing a different and distinct variable, the total number of lives saved in society.

It is easy to see how CBA's promoters were drawn to arguments that CBA (including the controversial equal discounting requirement) will maximize not just "net benefits," but also "lifesaving" (for, if so, CBA's

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79 Unless the agency is constrained by a statute or court order.

80 *See, e.g.*, McGarity, *supra* note 9, at 34–35; Lisa Heinzerling, *Discounting Life*, 108 YALE LAW J. 1911, 1912 n. 4 (1999).

81 *See infra* note 100.

82 Or one of its economic proxies, "net benefits" or "Kaldor-Hicks efficiency." *See* discussion *infra* Part I.A.3.a.

83 Garret Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968).

detractors are making utterly perverse policy arguments—they wish to save fewer lives *and* reduce net social welfare, all, apparently, for the sake of clinging to irrational, absolutist values). But the claim that equal discounting in CBA will enable regulators to both maximize some economic measure of welfare *and* maximize the total number of lives saved defies logic. In fact, this application of equal discounting will not maximize *either* variable.

2. *The claim that equal discounting will maximize the total number of lives saved fails*

The "lifesaving" argument may be attempting to persuade a readership that includes CBA skeptics who would find arguments that reduce to "equal discounting will maximize social welfare" unpersuasive. (To some, a decision that maximizes social welfare may be less attractive than a decision that doesn't, if, for example, most of the social welfare gains would inure to the benefit of healthy billionaires, and if some vulnerable people would experience welfare losses.)

It might make sense in the abstract to say that, instead of spending resources on a certain regulation, society as a collective unit could choose instead to invest those resources in mutual funds and buy more "lifesaving benefits" later. However, when we are talking about an actual agency decision-maker (and, in the case of any policy reviewed by OIRA, we always are), in general, the "next best" alternative to regulating is leaving the funds that would have been spent on compliance in the control of regulated industry and any other regulatory payors. Agencies are not empowered to tax, and neither may they direct the regulatory payors to take the money that would otherwise have been spent on the regulation and invest it for future lifesaving.[84] If there is no actual "opportunity" for the agency to cause the projected compliance costs to be invested in alternative future lifesaving, then this is not truly an "opportunity cost" of a decision to regulate.

In general, the biggest regulatory payors are actors that seek to maximize profits. A firm that doesn't have to buy a better scrubber for its smokestack is not going to invest the money it would have spent on the scrubber in a special account for future lifesaving. If agencies are unable to compel this behavior, and if a rational firm would not make this investment on its own, then to say an agency must determine before regulating whether one could theoretically save more lives in the future by investing the projected regulatory costs at current rates of return on investments is ridiculous. The agency simply lacks the power—by regulating or by forbearing to regulate—to cause this investment to occur, or to even make it more likely to occur.[85]

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84 Heinzerling, *supra* note 80, at 1912.

85 *See id.*

3. *The claim that the across-the-board equal discounting mandate serves to increase social welfare (or its proxy, "net benefits") also fails*

a. The projected investment gains of the next-best alternative to a regulation is not necessarily an appropriate CBA cost input

Opportunity costs (assuming they do represent actual forgone opportunities) are real economic costs, to be sure. However, some opportunity costs should not be used as cost inputs in CBAs. Understanding why requires some understanding of the theory that underlies cost-benefit analysis.

At its most ambitious and theoretical, costs-benefit analysis attempts to maximize total social welfare. It has its roots in the work of Wilfred Pareto, who postulated that "[a]n economic change is desirable if in the new situation at least one individual is better off and no individual is worse off."[86] Such an economic change is referred to as a "Pareto improvement."

Building on Pareto's work, economists like Nicholas Kaldor and John Hicks theorized that a policy could be socially beneficial—more "efficient," even—if it has the effect of making one set of people better off and another set worse off, so long as the winners could theoretically compensate the losers; this type of change is sometimes referred to as a "*potential* Pareto improvement."[87]

Cost-benefit analysis effectuates the Kaldor-Hicks principle that such potential Pareto improvements are social "benefits" regardless of who wins and who loses. If the sum of everyone's individual utilities before the change is less than the sum of everyone's individual utilities after the change, the change will be said to have had a net social benefit. Everyone's utilities are given equal weight. The *best* choice, under CBA, is the one that *maximizes* net benefits.

In its most sophisticated form, a CBA of a regulatory proposal accurately estimates expected changes in "consumer surplus"[88] and "producer surplus"[89] for various effective dates and levels of regulatory stringency, carefully identifies and quantifies any likely changes in government revenue, and perhaps uses distributional weights to value certain goods more (or less), depending on whether or not they are received

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86 CAROLINE DINWIDDY & FRANCIS TEAL, PRINCIPLES OF COST-BENEFIT ANALYSIS FOR DEVELOPING COUNTRIES 60 (Cambridge Univ. Press 1996).

87 *Id.* at 66–67.

88 Consumer surplus means "the accumulated difference between the market price and the price consumers would, at a maximum, have accepted to pay for the products purchased." MICHAEL FAURE & GORAN SKOGH, THE ECONOMIC ANALYSIS OF ENVIRONMENTAL POLICY AND LAW 87 (Edward Elgar Publishing 2003).

89 "Producer surplus" refers to the excess amount "producers receive above and beyond the minimum prices that would have been required to get them to produce and sell their output." EDWIN MANSFIELD & GARY YOHE, MICROECONOMICS 325 (W.W. Norton & Co., 11th ed. 2003).

or spent by populations who derive more (or less) utility from the relevant goods. The analyst ultimately arrives at a policy that maximizes social welfare (or "net benefits" or Kaldor-Hicks efficiency—all of these terms are used to mean essentially the same thing, in the CBA context.) But these very sophisticated, complete CBAs tend to reside mostly, if not entirely, in textbooks.

As Table 3, below, illustrates, real-world agency CBAs bear little resemblance to what one might expect from studying high-theory welfare economics textbooks. Once completed, even a comparatively sophisticated real-world analysis that cost an agency tens of thousands of dollars will ultimately generate (in addition to certain narrative and cost-effectiveness information) "bottom line" summaries like the following, which estimates net benefits for EPA's favored proposed rule on new source performance standards and emissions guidelines for sewage sludge incineration units.[90]

Even though not all benefits in Table 3 are monetized and included in the "net benefits" figure; even though the analysis does not purport to capture costs and benefits over the whole lifespan of the regulation; even though this analysis is undoubtedly flawed, still, there is no doubt that it is attempting to measure the change in societal benefits that will result from the regulation.

[90] The final regulation that was ultimately issued by EPA is similar, but not identical to, the proposal considered in the analysis summarized in Table 3. *See* Envtl. Prot. Agency, Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units, 76 Fed. Reg. 15372, 15380–82 (March 21, 2011).

Table 3: Summary of Estimated Costs, Benefits, and Net Benefits for the Year 2015, in 2008 Dollars, for an EPA Proposed Regulation for Sewage Sludge Incinerators[91]

	3% Discount Rate	*7% Discount Rate*
Total Public Health and Environmental Benefits[92]	$130M - $310M	$120M - $290M
Estimated "Annualized" Compliance Costs[93]	92M[94]	92M
Net Benefits for the Year 2015	**$37 - $220**	**$26 - $190**
Additional environmental benefits not monetized and not accounted for in the "net benefits" figures: 26,000 tons of carbon monoxide 96 tons of HCl 5,500 pounds of mercury 1.6 tons of cadmium 3.0 tons of lead 90 grams of dioxins/furans Health effects from reduced NO2 and SO2 exposure		

Assume, now, that the EPA has extremely wide discretion regarding precise effective dates and levels of stringency. In that case, even if the

[91] This table is adapted from RTI INT'L, REGULATORY IMPACT ANALYSIS: STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES AND EMISSION GUIDELINES FOR EXISTING SOURCES: SEWAGE SLUDGE INCINERATION UNITS 1–3 (September 2010) (Prepared for EPA). (Similar charts were presented for two additional regulatory alternatives. *Id.*) The RIA is available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2009-0559-0042.

[92] Note that this figure includes a small amount of "disbenefits," i.e., health *costs* that will result from the extra fuel consumption necessitated by the rule. *Id.* at 1–3. If differential discounting were operationalized, this type of accounting is a way agencies might apply the same discount rate to health benefits as to health costs.

[93] The regulatory impact analysis presents this data as the rule's "total social costs," but immediately clarifies that: "The annual compliances [sic] costs serve as a proxy for the annual social costs of this rule given the lack of difference between the two." *Id.* (The negative health effects of the regulation are accounted for in the benefits figure, as "disbenefits.")

[94] "Annualized" compliance costs were estimated to be $92M in 2008 dollars for the year 2015 (compliance costs appear to have been annualized over a period of fifteen years, so the costs for 2015 will include capital costs incurred earlier). *See id.* at 3-5 and C-33. Earlier in the analysis, it is explained that "Costs are on a 2008 basis, and annualized costs assumed an interest rate of 7 percent." *Id.* at 3-3. It is interesting that the EPA appears here to have engaged in a form of differential discounting when it subtracted annualized costs, discounted at 7%, from benefits discounted at 3%.

agency chooses the most cost-beneficial regulation possible, the "next-best alternative" to that regulation might be a regulation that is almost exactly as cost-beneficial as the option that was selected. The "next-best" alternative might have net benefits that are only a penny less than the alternative with the highest net benefits.

But this "opportunity cost" baseline is obviously the wrong baseline for cost-benefit analysis. If a rule generates a billion dollars in net benefits when compared to the status quo, pre-regulation world, then we wouldn't say that the net benefits of the rule are $0.01, even if an alternative version of the regulation that was also available to the agency would have generated only a penny less in net benefits (or would have had a rate of return that was, say, less than a billionth of a percentage point lower).

The command not to take an action for which the opportunity costs are greater than the expected benefits, and the command to maximize net benefits will—if we are monetizing and discounting goods the same way for both analyses—generate the same outcome. However, using "opportunity costs" (such as forgone alternative rates of return on "regulatory investment") as cost inputs in a CBA may prevent the CBA from measuring what it purports to measure. Instead of measuring net benefits from a "status quo" baseline (or some other plausible baseline), the analysis will measure net benefits from a "next best alternative" baseline. This will make it impossible for policy makers to compare projects using CBA: does a project with "net benefits" of a penny reflect an investment of resources with a low rate of return, or does that low "net benefits" figure merely reflect a high degree of rulemaking flexibility for the agency?

> b. Even accepting the OMB Guidelines' assumption that but for the regulation all regulatory costs would be invested at a rate equal to the discount rate, discounting all a regulation's *benefits* at the discount rate would still irrationally lower the net benefits of cost-beneficial regulations

While there is, of course, an economic value associated with leaving the money that would have been spent on regulation in the hands of regulated industry (and in the hands of any others who would bear regulatory costs), this is not a value that necessarily grows at some universal "expected inflation-adjusted…rate of interest in the economy."[95]

One might argue, for example, that even though a firm's foregone compliance costs will not be invested on the public's behalf, this money might be invested on the *firm's* behalf, and the loss of that investment gain to the *firm* should be considered an opportunity cost of regulating (after all, we are attempting with CBA to quantify all the costs and benefits that accrue to all segments of society as a result of regulation). But the act of forbearing to regulate will not cause an affected firm to invest all the

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[95] Graham et al., *supra* note 28, at 990.

foregone compliance costs on its own behalf, either, and any other regulatory payors (for example, any negatively-affected employees or customers) will not invest *all* of the regulatory costs foregone. Instead, some of this money will simply be consumed, and not invested,[96] and the amount of actual averted investment (and the relevant rates of return) will vary greatly across regulations.

One of the discount rates agencies must use in their cost-benefit analyses is 7%.[97] (This is a "real" rate, meaning this rate is applied after adjusting for inflation. Thus, if the annual rate of inflation is 2%, the corresponding "nominal" discount rate—the discount rate that also adjusts for inflation—is 9%.) Agencies applying the 7% real discount rate to benefits under this opportunity cost theory assume that, in the absence of regulation, the inflation-adjusted annual growth in value of the avoided compliance costs would be 7%. It is incorrect, however, to assume that the regulatory payors would invest the avoided compliance costs such that this money would experience growth at this rate. If 7% is the firm's return on investment after adjusting for inflation, then achieving 7% annual growth in the value of all the avoided compliance costs would require 100% reinvestment by the firm, with zero consumption during the lifespan of the proposed regulation. This is simply not a plausible assumption.[98]

For regulations for which the costs, invested at the discount rate, would not grow enough to exceed the expected benefits by the time the benefits are to be realized (that is, for any regulation that passes CBA under equal discounting), the problem is compounded. If all the foregone costs are unlikely to be invested, it is still less likely that a *larger* sum of money—i.e, the amount that would have to be invested at the discount rate in order for the value of the investment to equal the value of the regulatory benefits at the times they would have occurred—would be invested as a direct result of a regulator's decision not to regulate.

Returning to the smokestack example, assume the purpose of this proposed pollution reduction measure is to internalize an externality. This means the regulation will both reduce pollution and increase the firm's production costs, so that more of the public costs (or, the "negative externalities") of the firm's activities will be absorbed (or, "internalized")

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96 *See* Shane Frederick, *Valuing Future Life and Future Lives: A Framework for Understanding Discounting*, 27 J. OF ECON. PSYCH. 667, 671 (2006).

97 OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34. The other rate is 3%. *Id.*

98 Frederick, *supra* note 96, at 671. If the OMB's 3% discount rate is premised in opportunity cost, but is meant to reflect a partial investment at a higher rate of return, then this should be made explicit. The 7% rate (the other rate called for by the OMB guidelines), if it is premised in opportunity cost, cannot reflect much—if any—expected short-term consumption.

by the firm. Precisely because the firm is now bearing more of the costs of its pollution, it can be expected to pollute at more efficient levels.[99]

A decision not to regulate may provide measurable economic benefit to the polluting firm, its investors, and perhaps to its customers and employees; however, because the firm is engaging in activity (polluting) that causes a deadweight loss[100] to society (as uninternalized negative externalities always do),[101] these benefits come as part of a package that, on balance, likely reduces social welfare, the loss of which cannot necessarily be made up for by merely investing some sum of money that will be expected to grow at the discount rate.

To take a stark example, imagine that an agency is considering a regulation with an immediate cost of $100 (and no other costs), which would produce health benefits in 20 years that will have a monetized value of approximately $100,000 (in constant 2011 dollars) at that time. If that initial $100 were immediately invested at a 7% interest rate, it would still be worth less than $400 after 20 years. It makes no sense to say that the present value of that $100,000 in regulatory benefits is only $62,000 because, instead of funding the regulation, the initial $100 in costs could have been invested at market rates of return![102]

A key distinction between agency decisions and most private, financial investment decisions is that regulators don't necessarily have a panoply of options before them that is analogous to the selection that a private investor would likely enjoy. Among real agency alternatives, there may be no option that saves just one life more or fewer. Hypothetically, if OSHA were determining whether workers on low, 10-foot to15-foot aerial lifts should be required to wear full-body harnesses, there would most likely be a certain amount of discretion left to the agency; however, the agency must make some "investment" decisions for which there are no gradations at the margins. In the world of finance, it is generally possible to make gradated investment decisions. However, regulatory agencies may have to make binary, yes/no decisions that have large economic consequences. For

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[99] RICHARD E. JUST ET AL., THE WELFARE ECONOMICS OF PUBLIC POLICY, 527–33 (2004).

[100] In economics, "deadweight loss" is a social cost incurred when the market equilibrium, which sets the price of a commodity, does not reflect the socially optimum price point. *See* MANSFIELD & YOHE, *supra* note 89, at 330. This may occur when market failures, such as negative externalities and monopolies, affect the market equilibrium. *See id.*; *see also* FAURE & SKOGH, *supra* note 88, at 94–98.

[101] *See* JUST ET AL., *supra* note 99, at 529.

[102] Of course, if the benefits to be received in 20 years would have taken the form of *actual* money, and not health benefits, and if 7% is the correct discount rate for that money—if the recipient would be indifferent between receiving $62,000 now and $100,000 in 20 years—then those benefits may indeed be worth only $62,000 today. But the time value of the ultimate *monetary* benefit to its beneficiary has absolutely nothing to do with the value of the next-best regulation (or other investment) that was foregone when this regulation with $100 in social costs was chosen by the regulator.

practical or legal reasons, there may be a very large difference between the net benefits of a proposed regulation and the net benefits of its next-best available alternative.

The decision to discount all regulatory *benefits* at the rate of return foregone for regulatory *costs* seems to assume: (1) that there is likely an alternative investment for those costs that would have a rate of return approximately the same as the rate of return of the regulatory option being evaluated; and (2) that those opportunity costs are cost inputs that should be included in the CBA. Neither assumption is necessarily correct.

B. A RESPONSE TO THE SUNSTEIN/ROWELL ARGUMENT FOR EQUAL DISCOUNTING

In an interesting paper that defends the OMB's equal discounting requirement, Sunstein and Rowell acknowledge that the OMB Guidelines' "brisk" reference to opportunity costs might not provide a sufficient basis for equal discounting.[103] (They also acknowledge that, in the future, we may be willing to pay more to save lives, and so the "value of a statistical life" may be growing over time—see discussion *infra* Part III.B.) Sunstein and Rowell attempt to separate the issue of discounting's logic from the issue of discounting's ethics, and argue that logic compels that monetized health benefits be discounted. The resulting ethical problem (how to ensure that the present strikes the right balance between protecting its interests and protecting the interests of the future, when discounting can so dramatically lower the apparent value of current regulations whose benefits accrue to the future) must therefore be addressed through some method other than refusing to apply the "appropriate discount rate for money"[104] to health and environmental goods.

According to Sunstein and Rowell:

> If the issue is how much people now living will be willing to pay in twenty years to eliminate a risk of 1/100,000, the resulting amount must be subject to the appropriate discount rate for money—and hence a VSL [value of a statistical life] of $10 million, if that is the appropriate amount in twenty years, must be discounted too. The reason has nothing to do with discounting life or health; it is that a sum of money in the future is worth less than the same sum today. Recall that any particular dollar amount in twenty years is worth some fraction of that figure now not for any exotic or theoretically contentious reason, but because the fraction can be invested and made to grow.[105]

Sunstein and Rowell argue that it is not lives *per se* that are being discounted. Instead, they argue, we are only ever discounting *dollars*. If the life being saved in twenty years will have a monetized value of $10 million at that time, then the present value of saving that life is $5.54 million (at a

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103 *See* Sunstein & Rowell, *supra* note 18, at 177, 181.
104 *Id.* at 186.
105 *Id.*

3% discount rate) or $2.58 million (at a 7% rate), because that's how much a guarantee of $10 million of actual money in twenty years is worth now. "So long as valuations are based on private willingness to pay, there is no special problem with discounting money; any objection is to the use of willingness to pay, not to discounting as such."[106]

1. *There is no single discount rate that inheres in money,* qua *money; costs and benefits can easily be expressed in the same units and then discounted at different rates*

There exists no "appropriate discount rate for money," *qua* money; there is no single discount rate that inheres in all units of this good, even at a single point in time in a single economy. For example, outside of the CBA context, OMB has explained:

> Some Federal activities provide a mix of both Federal cost savings and external social benefits. For example, Federal investments in information technology can produce Federal savings in the form of lower administrative costs and external social benefits in the form of faster claims processing. The net present value of such investments should be evaluated with the 7 percent real discount rate[…]unless the analysis is able to allocate the investment's costs between provision of Federal cost savings and external social benefits. Where such an allocation is possible, Federal cost savings and their associated investment costs may be discounted at the Treasury rate, while the external social benefits and their associated investment costs should be discounted at the 7 percent real rate.[107]

Even assuming that monetization of extramarket intangibles through willingness to pay does generate dollar figures that should be treated like "any other money"[108] (and I argue below that it does not), as the above OMB quote shows, there is no one rate that is appropriate for all money. So, the mere monetizing of an extramarket good, in and of itself, cannot establish what its discount rate should be. (While the OMB Guidelines now demand that all goods be discounted using equal discounting at both 7% and 3%, with a "net benefits" figure calculated under each rate,[109] this is not because either figure is necessarily *the* appropriate rate for money, *qua* money.)

Thus, even if every cost and benefit itemized in a CBA were an actual monetary cost or benefit, it still would not follow that all benefits and costs should presumptively be discounted at identical rates.

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[106] *Id.* at 174. *See also* Heinzerling, *supra* note 80, at 1912 ("Money is discounted precisely because tomorrow's dollar is worth less than today's. If life is equivalent to money, its value must also decline with time.").

[107] OFFICE OF MGMT. & BUDGET, CIRCULAR NO. A-94 (1992), *available at* http://www.whitehouse.gov/omb/circulars_a094#8.

[108] Arden Rowell, *The Cost of Time: Haphazard Discounting and the Undervaluation of Regulatory Benefits*, 85 NOTRE DAME L. REV. 1505, 1514 (2010).

[109] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34.

2. *CBA arguably does require monetization of goods that are arguably incommensurable with money; still, some special handling of "incommensurables" is both economically sound and ethically preferable to treating these goods—once monetized—exactly like market commodities*

This paper focuses on CBA, but it is worth noting, as an aside, that the cost-*effectiveness* analyses that agencies submit to Sunstein's OIRA directly discount the values of future lives, *qua* lives.[110] Whatever justifies discounting of *those* lives, it cannot be the fact that the discounting is merely being done to a "sum of money," since those lives are discounted directly, such that any lives that aren't saved immediately are only worth a fraction of a life.

While it may be technically true that cost-*benefit* analysts apply discount rates to dollar amounts, and not directly to human lives (because a cost-benefit analyst converts the value of the life into dollars and then discounts the dollars), these analysts nevertheless diminish the present value of those lives just as surely as their counterparts who practice cost-effectiveness analysis.

In CBA, unlike cost-effectiveness analysis, all costs and benefits must be expressed in the same units. Theoretically, this base unit can be anything; it does not have to be monetary.[111] It could be apples.[112] It could be salt. But the mere act of converting the original good into equivalent units of the base good doesn't cause the original good to take on all the properties of the base good.

The mere act of expressing a regulation's non-monetary benefits in dollar equivalents does not cause the present value of those benefits to diminish at a real rate of 7% per year any more than expressing a regulation's benefits in equivalent units of salt would cause those benefits to become soluble in water. Put another way: we may know that in twenty years we will be willing to pay $10 million to avoid a death that year, but this fact alone does not tell us how much we will be willing to pay today (or ten years from now) to avoid that death, and learning the appropriate discount rate for that CBA's cost inputs does not answer the question. To find the present value of the averted death, we need to know the rate at which our willingness-to-pay (WTP)[113] values for this good are expected to

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[110] Oddly, the OMB currently recommends different, lower discount rates for use in cost-effectiveness analyses, which is used to evaluate the very same regulations evaluated with CBA. *See* OFFICE OF MGMT. & BUDGET, CIRCULAR No. A-94, Appendix C (2010), *available at* http://www.whitehouse.gov/omb/circulars_a094/a94_appx-c/.

[111] *See* Mark Ellington, *Numeraire Illusion: The Final Demise of the Kaldor-Hicks Principle*, *in* THEORETICAL FOUNDATIONS OF LAW AND ECONOMICS 96 (Mark D. White ed., 2009).

[112] *Id.*

[113] Or our willingness-to-accept values, if that is the correct estimation technique for that good in that context (see *infra* discussion of willingness-to-pay versus willingness-to-

change over time, because we are not just discounting a sum of money, we are discounting the value of a particular illiquid and non-fungible good that does not have all the characteristics of the base good, money, and so to know its value at any point in time we need more information than just its value at another point in time and the appropriate discount rate for regulatory costs.[114]

According to Rowell:

> If economic cost-benefit analysis has a claim to usefulness, it is because it converts disparate goods into a single metric: money. Money can be invested. This is one of its fundamental qualities. The practice of discounting monetized benefits stems from this quality: removing that characteristic from the mix means that we are no longer dealing with money. Instead, we are comparing classic soda to diet soda—"money" to something like "money lite," which has some (but not all) of the qualities of money.[115]

Well . . . yes. Rowell's analysis elucidates one of the fundamental problems with adding monetized values of intangible goods—like saved lives—that cannot be invested and are not fully commensurable with money, to a cost-benefit equation.[116] Non-fungible health and environmental goods simply do not share all of money's fundamental qualities, and this incommensurability is indeed a problem for the usefulness of cost-benefit analysis.

Whether the monetized values for extramarket benefits were originally derived through WTP or through some other method is irrelevant. Our mere knowledge of the present, monetized value of a health benefit that will occur at some specific, later point in time, along with our knowledge of the appropriate discount rate(s) for the other inputs in the CBA, are insufficient in and of themselves to tell us what the monetized value of that intangible health benefit will be if it is to occur at any other point in time. Frustrating though this may be for someone trying to produce a clean analysis, the

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accept at Part III.B); however, the Sunstein & Rowell analysis assumes that all values for intangible, non-monetary regulatory benefits will be derived through WTP estimates, and that assumption is adopted here.

[114] If we are willing to spend $7 million today to avoid exposing a child to a certainly lethal carcinogen with a 20-year latency period, and if the willingness to pay to avoid such a cancer case in twenty years, right before the cancer will become apparent, will be $10 million (controlling for inflation), we can conclude from this that the $7 million value the *present* ascribes to saving that life is greater than the present value of the *future's* willingness to pay to save that life (because the present value using the future's WTP is only $5.54 million or $2.58 million, under the 3% and 7% rates, respectively) (incidentally, this would create a difficulty—whose valuation should we use?). Or we can simply conclude that the value of this regulatory benefit does not diminish at the same rate as monetary benefits as the benefits are delayed.

[115] Rowell, *supra* note 108, at 1516.

[116] *See* Jane B. Baron & Jeffrey L. Dunoff, *Against Market Rationality: Moral Critiques of Economic Analysis in Legal Theory*, 17 CARDOZO L. REV. 431 (1996).

mere monetizing of these extramarket goods is insufficient to cause them to behave just like money.

Even in the context of CBAs, which arguably do demand monetization of all goods that are to be represented in the ultimate net benefits figure, we can set some limits on the extent to which we treat extramarket health and environmental goods as if they possess all the attributes of ordinary market commodities. Although I disagree with her conclusion, I find Rowell's insight about "money lite" extremely helpful to my understanding of how monetized intangibles ought to be treated in a CBA. Even after monetization, they ought to be treated as uninvestible; they ought to be treated as "money lite."

Given the way CBAs are already calculated, differential discounting should be relatively easy to operationalize in many analyses. Real-world CBAs generally list a limited set of monetized costs and benefits—which are already itemized and discounted separately from one another—and subtract the discounted costs from the discounted benefits to arrive at a net benefits figure. (Economists and students of public policy who are acquainted with "high theory" CBA might find many of these analyses surprisingly crude.[117])

3. *Even if all benefits were investible, this would not justify an equal discounting requirement*

Assuming, *arguendo*, that all CBA inputs derived through WTP estimations should be treated as investible, under the theory that investability is an intrinsic characteristic of money, this fact alone would not justify an across-the-board equal discounting mandate.

Sunstein and Rowell claim that once the values of lives saved are monetized, they must be discounted because "a sum of money in the future is worth less than the same sum today. Recall that any particular dollar amount in twenty years is worth some fraction of that figure now not for any exotic or theoretically contentious reason, but because the fraction can be invested and made to grow."[118] This is the language of opportunity cost, and this claim is similar to the standard opportunity cost argument discussed in Part II.A., above. But while the OMB Guidelines justify equal discounting based on the theoretical investability of all the regulatory costs, Sunstein and Rowell seem to justify equal discounting based on the theoretical investability of the benefits. But even if both costs and benefits

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[117] Much of this may be a result of the difficulty of obtaining the data needed for a complete accounting of regulatory costs and benefits. *See* Natural Res. Def. Council v. EPA, 804 F.2d 710, 716 (D.C. Cir. 1986) (Bork, J.) (stating that in the context of hazardous air pollutants, "we find it unthinkable that science may ever yield absolute certainty of safety in an area so complicated and replete with problems of measurement, modeling, long latency, and the like[.]").

[118] Sunstein & Rowell, *supra* note 18, at 186.

were investible, they might not both be investible at precisely the same rates of return, and so equal discount rates may not appropriate.

Assuming the regulatory benefits in question are investible—assuming, even, that they will take the form of actual money—that fact alone cannot establish that identical discount rates must apply to the costs and the benefits. If the winners and the losers have very different constraints and very different investment opportunities, they might reveal very different present values for identical guarantees of future money. While it might be convenient to assign equal rates to all monetary sums that enter a CBA, this policy is in no sense compelled by logic.

C. AN "OPPORTUNITY COST PARALYZING PARADOX," AND WHY IT IS IRRELEVANT TO THE ISSUE OF DIFFERENTIAL DISCOUNTING

The standard opportunity cost rationale for discounting, discussed in Subpart A, is often combined with an assumption that the inflation-adjusted cost of lifesaving will never change, leading commentators to conclude that even when, after equal discounting, the present value of the benefits of regulating now are less than the present value of the costs of regulating now (that is, even if regulating now would be cost-beneficial under equal discounting), it may still make sense to delay regulation to achieve the maximum possible lifesaving benefit:

> While human lives are priceless from a philosophical or religious perspective, the resources that can be used to save lives are limited. If we fail to recognize this economic reality as we go about the process of choosing regulations, we will expend resources in a way that prevents us from saving as many lives as possible. It is not the idea that future lives are less valuable in any moral or ethical sense that leads to the process of discounting at a current rate of interest. Rather, discounting is appropriate in that, if invested, our resources are expected to grow at that rate, so that if we forego spending and invest the money instead, we can save more lives in the future with the amount foregone today.[119]

> The central rationale for discounting future lifesaving is the opportunity cost of investing resources now—since lifesaving may not occur for many years, or possibly decades. If instead of expending $1 billion today to save 1000 lives ten years from now, we invest the $1 billion for ten years at a 3% real rate of interest, we will accumulate $1.34 billion to invest in lifesaving (or other purposes) ten years from now. If the marginal (inflation-adjusted) cost of saving lives is the same ten years from now as it is today, investing the resources will enable us to save 1340 lives ten years from now—340 more than we will save by making the immediate lifesaving expenditure.[120]

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[119] John J. Donohue III, *Why We Should Discount the Views of Those Who Discount Discounting*, 108 YALE L.J. 1901, 1905 (1999).

[120] Graham, *supra* note 27, at 504.

But why stop at only 1,340 lives? If Graham is right that "we" can invest the resources that would have been spent on the regulation at a 3% real rate, and if he is correct in his assumption that the marginal, inflation-adjusted cost of saving lives is not increasing, then (with apologies to Heinzerling, who has made a very similar point)[121] we could save 19,219 lives by waiting 100 years. We could save 2,621,877,234 lives by waiting 500 years. Under the terms of the example above, rather than make a current investment of $1 million per life to be saved ten years from now (even at a 7% discount rate, and using the values for lives saved in current use at the agencies, this proposal "passes" cost-benefit analysis in the sense that its costs are less than its benefits, even after equal discounting), we should not regulate if we could theoretically save more lives in the future by investing our regulatory budget. However, the catch, under this set of assumptions, is that it may always make sense to leave that budget invested; under these constraints, we may never actually get around to saving any of those lives.[122] (And note that while Graham, in the quote above, does not make it clear that the lives we are paying to save ten years from the present will actually be saved ten years after the money is spent, this is obviously true. Graham assumes that the marginal cost of lifesaving is static; therefore, if it takes a current expenditure of $1 million to save a life ten years from now, then in ten years it will cost $1 million to save a life twenty years from now.)

This version of the opportunity cost argument compounds the error of the opportunity cost argument discussed in Subpart A, above, by adding an erroneous assumption that the marginal, inflation-adjusted cost of saving lives is not increasing. But there is ample evidence that the marginal cost of saving lives in the United States *is* growing faster than the rate of inflation.[123]

This opportunity cost-plus argument would generally prohibit current investments in lifesaving whenever more lives could theoretically be saved in the future, but two false assumptions—i.e., the cost of lifesaving grows *at* the rate of inflation, and the money to be spent on lifesaving would, in the absence of regulation, be invested and made to grow *faster* than

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121 *See* Heinzerling, *supra* note 80, at 1912.

122 *See id.*

123 Robert E. Hall & Charles I. Jones, *The Value of Life and the Rise in Health Spending*, 122 QUART. J. OF ECON. 39, 59–60 (2007). Ben Trachtenberg, in an article that was published while this piece was in press, writes that "[s]ince 1980, health [care cost] inflation has outpaced general inflation on average by more than 3% annually." Ben Trachtenberg, *Health Inflation, Wealth Inflation, and the Discounting of Human Life*, 89 OR. L. REV. 1313, 1327 (2011). Trachtenberg argues that the increasing rate of health spending is evidence that the public's "willingness-to-pay" for reduced mortality risks is rising at about the same rate. *Id.*

inflation[124]—game the analysis, making it excessively difficult to justify regulation.

As a rationale for equal discounting, this variation of the opportunity cost argument fails completely. It attempts to justify the discounting of lifesaving benefits on the ground that this discounting will ultimately cause a larger total number of lives to be saved. Discounting is normally understood to reflect our understanding of how the present values of the goods being evaluated will actually change as the timing of the benefits change. But, accepting for the moment that Graham and Donohue are correct in their apparent understanding that lifesaving benefits should be discounted at whatever rate will best point analysts toward saving the greatest total number of lives with their regulatory budget, recall the assumptions they make: (1) instead of promulgating the regulation at issue, the agency could instead cause the regulation's projected costs to be invested for future lifesaving; (2) if invested, the averted regulatory costs could be made to grow faster than inflation; and (3) the inflation-adjusted cost of lifesaving is static, and so, for example, if a present expenditure of $1 billion would save 1,000 lives in ten years, then we could also spend (an inflation-adjusted) $1 billion in 10 years to save 1,000 lives in 20 years.

As discussed above, these assumptions together would create a sort of "opportunity cost paradox" for an agency that wants to spend the investable regulatory budget at whatever time it would save the largest number of lives. Equal discounting would—under these assumptions—simply paralyze the agency, and thus could not result in the increased lifesaving that Graham and Donohue predict.

Even if one assumes that this problem has been dealt with, and that some mechanism (such as a time limit, after which any investment for future lifesaving must be spent) will ensure that all the investments we make in lieu of immediate regulation will eventually be spent to save lives, this rationale for equal discounting still fails.

Return to Graham's example, where a decision maker can save 1,000 lives (in ten years) by causing $1 billion to be spent today, and this represents the fixed marginal cost (in current dollars) of saving lives ten years after the date of the expenditure, and where any of that $1 billion not immediately spent on regulation could be invested at an inflation-adjusted 3% annual interest rate. One finds that, when the monetized values of the lifesaving benefits are discounted at the same 3% rate used for costs, we are indifferent between buying regulatory benefits right now, and investing the money and buying regulatory benefits at any time in the future.

However, when the lifesaving benefits are discounted at a lower rate than monetary costs, the value of the lives to be saved in the future exceeds the value of the (smaller number of) lives that would be saved if the expenditure were made today. The closer the discount rate for benefits gets

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124 *See* Heinzerling, *supra* note 80, at 1911–12 (making a similar point).

to zero, the more strongly we would prefer later regulatory expenditures, which would save more lives.

It is important to remember that none of this is relevant to the question of whether differential discounting is correct in the real world, where at least two of Graham and Donohue's key assumptions do not hold. The point here is that even if all of Graham and Donohue's assumptions *were* correct, this "opportunity cost-plus" argument would still fail to justify a preference for equal discounting over differential discounting.

III. VALUING FUTURE HEALTH AND ENVIRONMENTAL GOODS

Once the discount rate for health and environmental goods is untethered from the discount rate for money; once neither the concept of opportunity cost nor any perceived "paradoxes" are understood to compel equal discounting; and once these discount rates can, therefore, be independently derived, the question becomes: what *should* the discount rate for health and environmental benefits be? Identifying the precise rate(s) that should be used for these goods is beyond the scope of this paper.[125] However, the purpose of this section is to establish that, as the time when these benefits will be enjoyed becomes more distant, the present value of these benefits generally declines, if at all, much more slowly than the present value of a monetary benefit would. Therefore the discount rate for health and environmental goods should be significantly lower than the rate for money.

While the OMB and some law review authors have claimed that there is a "professional" or "technical" "consensus" in favor of equal discounting in cost-benefit analysis,[126] there exists a spirited cost-effectiveness analysis literature that makes the case for differential discounting. While some of that analysis admittedly cannot be directly applied to cost-benefit analysis, the arguments made in that literature that health benefits—unlike money—are becoming more valuable over time have clear applicability to CBA.

Subpart A makes the case that health and environmental goods do not behave like most other goods (including money), in that we do not necessarily value additional units of these goods less as we acquire more of them, and explains why this implies that money should be discounted at a higher rate than these goods. Subpart B discusses the evidence that the dollar values of health and environmental goods (as measured by

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[125] For the Netherlands, the correct discount rate for monetary costs has been estimated to be about 4%, while the correct differential discount rate for health has been estimated to be about 1.5%. Rogier M. Klok et al., *Towards a Healthier Discount Procedure*, 5 EXPERT REV. PHARMACOECONOMICS OUTCOMES RES. 59, 62 (2005). Before switching to equal discounting in 2004, the United Kingdom's National Institute for Health and Clinical Excellence specified differential discount rates of 6% for costs and 1.5% for effects. Werner B. F. Brouwe et al., *Need for Differential Discounting of Costs and Health Effects in Cost Effectiveness Analyses*, 331 BRITISH MED. J. 446 (2005).

[126] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9 at 34; *see also* Graham et al., *supra* note 28, at 991.

individuals' willingness to pay for them, and the amount individuals must be compensated before they would willingly give them up) seem to be rising over time. Subpart B again discusses the work of Sunstein and Rowell and notes that—in a paper that purports to make the case for equal discounting—they actually agree in theory to what others have called differential discounting; if this proposal by Sunstein and Rowell were actually operationalized, it would go a long way toward improving the accuracy and rationality of agency cost-benefit analyses.

A. MARGINAL UTILITY

According to the OMB Guidelines, "if consumption continues to increase over time, as it has for most of U.S. history, an increment of consumption will be less valuable in the future than it would be today, because the principle of diminishing marginal utility[127] implies that as total consumption increases, the value of a marginal unit of consumption tends to decline."[128] But, whether additional units of a good will have a declining marginal utility will depend on what, exactly, the good is. While some goods (e.g., money) do have a diminishing marginal utility, other goods (e.g., saved lives) do not.

As discussed in Part I.A.3.a., *supra*, the welfare economics premise of CBA is that a regulation's true net benefits will be equal to the sum of all the welfare changes (positive and negative) for all who will be affected by the regulation. While improving net social welfare may not be the *only* goal of government, the impact of a proposed regulation on total social welfare—assuming, *arguendo*, that changes in social welfare can be estimated in any meaningful way—would be at least a relevant consideration for most policy makers. In part because it is impossible to know precisely how much "welfare" each affected individual will derive from any regulation, in practice even the best CBA can only generate a very rough estimate of the net social benefits (or costs) of the proposal. In cost-benefit analysis, as it is actually practiced, a dollar given today to Mark Zuckerberg is considered to improve societal well-being just as much as a dollar given today to a family living in poverty. In reality, there is a greater social welfare gain when a dollar is given to the family living in poverty, because Mark Zuckerberg is a billionaire with so many dollars that one additional unit of this good will have little or no impact on his welfare.

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[127] Marginal utility is the extra utility derived from each additional unit of a commodity. *See* MANSFIELD & YOHE, *supra* note 89, at 57. Beyond a certain point, "marginal utility declines as the amount consumed increases." *Id.* at 59. The law of diminishing marginal utility "states that, as a person consumes more and more of a given commodity (the consumption of other commodities being held constant), the marginal utility of the commodity will eventually tend to decline." *Id.* at 59.

[128] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 32 (footnote added).

Unfortunately, CBA, as it is actually practiced, cannot account for this difference.[129]

However, because the United States is projected to become wealthier over time,[130] discounting the value of future dollars beyond what is necessary to control for inflation is seen as a way to account for the fact that each additional unit of money is worth more to the present than it will be to the wealthier future.[131] While an analyst cannot easily account for the difference in value between a dollar given to a rich person today and a dollar given to a poor person today, by discounting money she can at least account for the difference in value between a dollar given to the wealthier future, as opposed to the comparatively poor present.

But not all goods have a diminishing marginal utility, and so not all goods need to be discounted to account for this phenomenon. As others—primarily in the health economics literature dealing with cost-effectiveness analysis—have pointed out, the marginal utility of health is very unlikely to fall as quickly as the marginal utility of money as wealth increases.[132]

It is possible that as the United States becomes wealthier, we will spend a greater percentage of our money purchasing healthy food, health club memberships, and preventative care. But it is also possible that we will consume more energy from polluting sources, buy more large SUVs, and take other actions that further decrease our air quality, thereby causing more asthma attacks and upper respiratory infections, negatively impacting maternal and fetal health, and further increasing the number of days parents are asked to keep children in especially polluted areas from playing outside. If current trends continue, our rates of obesity and diabetes are projected to continue rising in the future.[133] In short, it is *possible* that, as our nation's wealth grows, our health will improve in lockstep, but many of our current health and consumption patterns would seem to counsel against assuming such a relationship. Similarly, an analyst should not assume, without evidence, that the marginal utility of clean water will decrease as we get wealthier or that the marginal utility of unpolluted air will decrease over time.[134] In fact, an inverse relationship may be more likely, because these goods may become scarcer as wealth and consumption increase.

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[129] While some analysts do recommend weighting any benefits that accrue to the poor, this practice has not been adopted by agency cost-benefit analysis practitioners.

[130] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 36.

[131] *Id.*

[132] *E.g.*, Gravelle et al., *supra* note 45, at 307.

[133] Youfa Wang et al., *Will All Americans Become Overweight or Obese? Estimating the Progression and Cost of the US Obesity Epidemic*, 16 OBESITY 2323 (2008); James P. Boyle et al., *Projection of the Year 2050 Burden of Diabetes in the US Adult Population: Dynamic Modeling of Incidence, Mortality, and Prediabetes Prevalence*, POPULATION HEALTH METRICS (2010), *available at* http://www.pophealthmetrics.com/content/pdf/1478-7954-8-29.pdf.

[134] *See* Revesz & Shahabian, *supra* note 29, at 1159.

For some health goods, marginal utility does not diminish at all. Just as it is easy to imagine having so much money that an additional dollar matters little, it is possible to imagine a future population so robustly healthy that it places a rather low value on additional units of "healthiness." But it is very difficult to imagine having so many people alive that we don't care whether additional children are killed in traffic accidents. While the marginal utility of some goods, arguably even some health goods, falls as more goods are acquired, it is extremely unlikely that in the future the sheer number of people alive will make us less interested in saving their lives.

Lives saved by regulation are goods that must be included in the cost-benefit calculus; however, averted deaths are one case where the value to society of each additional unit does not decrease as more units are acquired. In short, if the country is projected to become wealthier, then discounting money to account for its diminished marginal utility is certainly appropriate. However, increased wealth will not necessary decrease the marginal utility of health and environmental goods. In fact, even increased *health* would not necessarily decrease the marginal utility of certain of these goods, such as averted deaths.

B. AS WEALTH INCREASES, THE ACTUAL VALUES OF HEALTH AND ENVIRONMENTAL GOODS INCREASE

A related reason to use a lower discount rate for health and environmental goods than for monetary costs is to account for the fact that the actual monetized values of health and environmental goods are rising. Willingness-to-pay (WTP) and willingness-to-accept (WTA) are the two methods principally used to arrive at dollar values for goods that are not traded in markets, and therefore don't have a ready price. WTP is the highest price one is willing to pay for a good, while WTA is the minimum price one would accept to sell it.[135] (For health and environmental goods, WTA values generally exceed WTP values.[136] While in theory the choice between WTP and WTA values should be determined by who has the stronger rights interest in the good in question—the public or the entity being regulated[137]—in practice, WTP is the measure that is nearly always used in CBAs.)

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[135] *See* Richard O. Zerbe, *Is Cost-Benefit Analysis Legal? Three Rules*, 17 J. POL'Y ANALYSIS & MGMT. 419 (1998).

[136] *Id.*; *see also* Michael W. Haneman, *Willingness to Pay and Willingness to Accept: How Much Can They Differ?*, 81 AM. ECON. REV. 635 (1991). *But see* Kathryn Zeiler & Charles R. Plott, *The Willingness to Pay/Willingness to Accept Gap, the "Endowment Effect," Subject Misconceptions and Experimental Procedures for Eliciting Valuations,* 95 AM. ECON. REV. 530 (2005) (arguing that WTP and WTA may converge when experimental subjects are better educated by testers).

[137] Richard O. Zerbe, *The Legal Foundation of Cost-Benefit Analysis*, 2 CHARLESTON L. REV. 93, 120–21 (2007).

Evidence shows that our WTP for environmental goods is increasing as wealth increases,[138] and though WTA values for environmental goods are not tied as directly to wealth, it makes sense that wealthier individuals (and societies, for that matter) can better afford to decline opportunities to sell their environmental resources. Similarly, as our wealth increases, our WTP and WTA values for health goods will also tend to grow; this phenomenon is illustrated by the fact that wealthier countries have much higher WTP and WTA values for health gains and losses than developing nations.[139] Indeed, "the evidence that [the value of a statistical life] increases with wealth is quite strong."[140]

Sunstein and Rowell, in addressing this relationship between the value of a statistical life (VSL) and wealth, make a proposal that—if actually operationalized—could go a long way toward improving agencies' economic analyses of regulations:

> As we have noted, it is correct to say that national wealth tends to increase over time, and hence people will likely be wealthier in twenty years than they now are. Because they will be wealthier, they will demand more to be subject to statistical risks. For this reason, use of the current VSL to calculate monetary amounts in the future likely produces unjustifiably low numbers. But these are not points against discounting. They simply suggest that the numbers that must be discounted are higher than regulators currently recognize. *The proper analysis uses a multiplier for*

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138 *See* Revesz & Shahabian, *supra* note 29, at 1159–61.

139 *E.g.*, Frank Ackerman & Lisa Heinzerling, *If It Exists, It's Getting Bigger: Revising the Value of a Statistical Life*, Global Development and Environmental Institute Working Paper No. 01-06 (2001), *available at* https://www.ecoeco.org/pdf/ value_of_life.pdf; NILS AXEL BRAATHEEN ET AL., VALUING LIVES SAVED FROM ENVIRONMENTAL, TRANSPORT AND HEALTH POLICIES: A META-ANALYSIS OF STATED PREFERENCE STUDIES 19 (2009), *available at* http://www.oecd.org/dataoecd/20/48/43809818.pdf; *see also* LISA A. ROBINSON & JAMES K. HAMMITT, THE VALUE OF REDUCING AIR POLLUTION RISKS IN SUB-SAHARAN AFRICA, FINAL REPORT 9 (2009), *available at* http://www.regulatoryanalysis.com/robinson-hammitt-air-pollution-africa.pdf ("Because VSL is related to income, it is likely to vary across individuals, communities, and countries with different income levels."); RICHARD O ZERBE, ECONOMIC EFFICIENCY IN LAW AND ECONOMICS, 251 (2001).

One of the sources relied on by the Second Assessment Report of the UN's Intergovernmental Panel on Climate Change offered the following reassurance to readers regarding a *15-fold* difference in VSLs for developed nations versus low-income developing nations: "This of course does not mean that the life of, say, a Chinese is worth less than that of a European. It merely reflects the fact that the willingness to pay for increased safety (a lower mortality risk) is higher in developed countries." SAMUEL FANKHAUSER, VALUING CLIMATE CHANGE: THE ECONOMICS OF THE GREENHOUSE EFFECT 47 (1995). (Unsurprisingly, developing nations—many of which may expect to bear a disproportionate share of the costs of the developed world's contributions to global climate change—have not been very impressed with this sort of argument. *See* Fred Pearce, *Global Row over Value of Human Life*, NEW SCIENTIST, Aug. 19, 1995, at 7.)

140 Henrik Andersson & Nicolas Treich, *The Value of a Statistical Life*, Working Paper 09.04.280, LERNA, University of Toulouse (2009), *available at* http://www2.toulouse.inra.fr/lerna/treich/VSL.pdf. *See also* Trachtenberg, *supra* note 123.

> *national income growth and any other relevant factors, and applies a discount rate from that point.*[141]

This concession, coming as it does from the current head of OIRA, in a paper that purports to make the case for equal discounting, is staggering. Compare the italicized portion of the quote above with the following quote, which is taken from an article that makes the case for differential discounting in cost-effectiveness analysis: "This discount rate for health effects is equal approximately to the discount rate for costs minus the annual rate of increase in the value of health."[142] Sunstein and Rowell's version of equal discounting of lives saved is mathematically *identical* to the differential discounting being promoted by some health economists for use in cost-effectiveness analysis.

To meet the standard for a "proper analysis" described by Sunstein and Rowell, any equal discounting of monetary and health goods should be preceded by the appropriate use of multipliers. Unfortunately, their proposal has not been incorporated into the OMB Guidelines, and the agency analysts who draft the CBAs reviewed by OIRA still do not apply "multipliers for national income growth and other factors" before subjecting intangible public health and environmental benefits to the same discount rate used for monetary costs.[143]

CONCLUSION

A 1982 "Handbook on Economic Analysis," meant to provide guidance to the practical economist conducting cost-benefit analysis for the government, provides a number of differential escalation factors intended to account for the fact that not all goods factored into the CBA should be discounted at some universal rate.[144] The 1982 handbook contemplates different discount factors within the same analysis.[145] But, over time, the notion that different rates might be used to discount different goods within a single CBA has completely lost credibility among practitioners, to the point where both the OMB and leading CBA theorists now maintain there

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[141] Sunstein & Rowell, *supra* note 18, at 186–87 (emphasis added, citation omitted). While this article was in press, a paper was published that develops and defends a discounting methodology that would work in a similar manner to the Sunstein/Rowell "multiplier" proposal. Trachtenberg, *supra* note 123. Adoption of Trachtenberg's methodology, like the adoption of the Sunstein/Rowell proposal, would be a substantial improvement over the way discounting is currently handled in CBAs.

[142] Gravelle et al., *supra* note 45, at 307.

[143] *See* OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9; *see also* OFFICE OF MGMT. & BUDGET, AGENCY CHECKLIST, *supra* note 9 (directing agencies to follow the OMB Guidelines).

[144] RESEARCH AND EDUCATION ASSOCIATION, HANDBOOK ON ECONOMIC ANALYSIS 115–16, F2–F8 (1982).

[145] *See, e.g.*, *id.* at 116, F2–F8.

is a "consensus" among economists that equal discounting is always required in CBA.[146]

While it is probably true that most analysts who produce CBAs for government agencies have long been resigned to the decades-old requirement for equal discounting, it is important to remember that this requirement was first instated by an OMB with an openly deregulatory agenda and which consistently selected anti-regulation methodologies. The decision to use equal discounting in regulatory CBAs was not really a case of the better-reasoned argument prevailing in the free marketplace of ideas.

If an agency must conduct a CBA on a regulation expected to generate public health or environmental benefits, a better strategy would be to discount any non-monetary goods at the correct rate for that particular good in that particular analysis. For health and environmental goods, that rate should generally be significantly lower than the rate used for money. The time has come for OMB to reconsider its long-standing directive that executive agencies must always discount health and environmental benefits at the same rate as monetary costs; failing this, and given that OMB's methodological guidelines are not actually binding on the agencies, executive agency analysts should nevertheless consider differential discounting of health and environmental goods to be a legitimate—and logically defensible—option.

[146] OFFICE OF MGMT. & BUDGET, REGULATORY ANALYSIS, *supra* note 9, at 34; *see also*, Graham et al., *supra* note 28, at 991.