A R T I C L E

Rethinking Health-Based Environmental Standards and Cost-Benefit Analysis

by Michael A. Livermore and Richard L. Revesz

Michael A. Livermore is an Associate Professor of Law, University of Virginia Law School and Richard L. Revesz is the Lawrence King Professor of Law and Dean Emeritus, New York University School of Law.

Whitman v. American Trucking Associations, Inc., is understood by advocates and commentators across the political spectrum to hold that the U.S. Environmental Protection Agency (EPA) may not consider costs when setting National Ambient Air Quality Standards (NAAQS) under the Clean Air Act.[1] This decision was lauded by protection-oriented groups as a major victory for public health and the environment, and severely criticized by regulated industry and anti-regulatory groups for imposing burdensome costs in pursuit of unrealistic levels of environmental safety.[2] Both sides therefore seem to agree that were the EPA to engage in cost-benefit analysis of its proposed air quality standards, the results would be more industry-friendly and less environmentally protective.

The standard reading of *Whitman*, and its implementation by EPA, gives rise to two interrelated pathologies. We call the first the stopping point problem. Frequently, the complete elimination of public health risks from pollution could be accomplished only by banning all emissions. Such stringent standards would lead to widespread social dislocation that even strongly pro-environmental commentators regard as undesirable.[3] But when costs cannot be considered, it is difficult to justify any stopping point other than zero. The result is an elaborate obfuscation of the true reasoning underlying the agency's decision, undermining core values of the administrative state.

The second problem, which we refer to as the inadequacy paradox, arises because, contrary to the conventional account, the requirement that EPA set the NAAQS without considering costs has *not* led to more stringent environmental standards. We examine the regulatory impact analyses conducted for the most recent NAAQS rulemakings and find that, in all of the cases where the relevant data is available, the standards set by EPA were *less* stringent than those that would have resulted from the application of cost-benefit analysis.[4] Ironically, by eliminating costs from EPA's calculation, *American Trucking* promoted environmental standards that imposed sub-optimally low costs on industry. And the application of cost-benefit analysis, a methodology that remains suspect in many environmentalist circles,[5] would have resulted in cleaner air.

We argue that health-based standards should never be less stringent than the standards determined by cost-benefit analysis, thereby solving the inadequacy paradox. The central justification for health-based standards is that the level of regulatory protection should not be compro-

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1. 531 U.S. 457 (2001).
2. *Compare* Editorial, Clean Air—and Congress—Wins, Wash. Post, Feb. 28, 2001, at A24 ("[T]he court handed public health a major victory . . . ."), *with* Katherine A. Kelley, *MMS Shop Talk*, Modern Machine Shop, Apr. 30, 2001, at 42 (relating the "profound disappointment" of the National Association of Manufacturers).
3. *See* Douglas A. Kysar, Regulating From Nowhere 20 (2010) ("Risk-risk, health-health, and environment-environment trade offs may be in some sense inevitable, as the economist reminds us, but they are *regrettably* so.").
4. EPA prepares regulatory impact analyses (RIAs) for the NAAQS, even though they do not formally consider them during the rulemaking process. Throughout this Article, we assume that these analyses would not be substantially different in a counterfactual situation where they were used as the basis for the final rulemaking. We were unable to undertake this analysis for the carbon monoxide standard because no RIA was performed during the most recent review of the carbon monoxide standard in August 2011. E-mail from Tom Walton, Economist, Air Benefit & Cost Group, HEID/OAQPS/OAR/EPA (Sept. 12, 2012) (on file with the *New York University Law Review*). EPA had performed an RIA during its 1985 review of the standard but did not monetize the benefits. *See* U.S. Envtl. Prot. Agency, Regulatory Impact Analysis of the National Ambient Air Quality Standards for Carbon Monoxide, EPA-450/5-85-007, 19 (1985). This version updates the analysis in the original article to include the 2015 ozone standard. *See infra* note 42.
5. *See* Richard L. Revesz & Michael A. Livermore, Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health 9 (2008) (noting that the "liberal camp" is skeptical of cost-benefit analysis which it generally views as "a technique that has historically been invoked to justify deregulation or less stringent regulation").

mised by cost considerations. The current status quo turns this argument on its head, producing health-based standards that are less stringent than those that would result had cost been properly considered. *American Trucking* should not be interpreted as standing in the way of using cost-benefit analysis as a regulatory floor. Implementation of this alternative reading would also relegate the stopping point problem to the background because cost-benefit analysis would frequently be the operative principle used by the agency to set the NAAQS.

I. Approaches to Environmental Standard Setting

The major U.S. environmental statutes contain three principal approaches for determining the stringency of environmental protection: cost-benefit standards, feasibility standards, and health-based standards. Cost-benefit analysis, in its most general form, places both costs and benefits along a common metric and supports the standard that maximizes net benefits (the difference between benefits and costs).[6] As practiced in the United States over the past several decades, cost-benefit analysis is grounded on a welfare economic conception of social good and measures net benefits through preference satisfaction, determining the desirability of a policy based on values assigned by those who are benefited and burdened by that policy.[7] Uncertainty and risk are dealt with through a rational utility maximization framework based on expected outcomes, taking account of risk aversion when appropriate.[8]

There is a lengthy and contentious literature on cost-benefit analysis and its normative desirability. Defenders of cost-benefit analysis include Professor Cass Sunstein,[9] who served as the OIRA Administrator under President Barack Obama, and Justice Stephen Breyer,[10] who has argued that tools like cost-benefit analysis can rationalize the regulatory process. Critics include Professors Lisa Heinzerling[11] and Douglas Kysar,[12] who maintain that cost-benefit analysis is indeterminate, includes questionable moral assumptions, and divorces rulemaking from the democratic process.

Critics of cost-benefit analysis have themselves been frequently criticized for lacking a normatively attractive alternative.[13] One response they have offered is feasibility standards, the second major approach to setting environmental regulation. Professor David Dreisen, a strong advocate of feasibility standards, defines them as requiring "stringent regulation" subject to constraints on "physically impossible environmental improvements" and standards "so costly that they cause widespread plant shutdowns."[14] Professors Eric Posner and Jonathan Masur recently offered a persuasive argument that feasibility standards are normatively undesirable because they lead to "significant problems of over- and underregulation."[15]

Health-based standards, the subject of this Article, are the third principal approach to determining the stringency of environmental regulation. These standards seek either the entire elimination of a public health risk or, failing that, the achievement of what is deemed to be an acceptable level of risk.[16] They thus differ from cost-benefit standards because they do not (explicitly) trade off health improvements against competing social priorities such as costs. They differ from feasibility standards because they are not constrained by what a particular industry could achieve without going out of business.

II. Stopping Point Problem

When setting the NAAQS, EPA faces choices that it cannot resolve on health considerations alone. These decisions require the agency to identify a stopping point for regulatory stringency: a limit to the percentage of the population that will be protected; a level of scientific uncertainty about exposure-health relationships that will be tolerated; and the minimum health effect that will be deemed acceptable. Because the agency can take only health into consideration, it cannot undertake the balancing of competing factors that is inevitably required to answer these questions.

Under the Clean Air Act, EPA is directed to set both primary and secondary NAAQS based on a "criteria" document that analyzes the most current scientific infor-

6. Michael A. Livermore, *Can Cost-Benefit Analysis of Environmental Policy Go Global?*, 19 N.Y.U. Envtl. L.J. 146, 150 (2011).
7. *See* Lewis A. Kornhauser, *On Justifying Cost-Benefit Analysis*, 29 J. Legal Stud. 1037, 1039 (2000) ("[I]ndividual well-being is understood as the satisfaction of subjective preferences; in practice these subjective values are inferred from market choices of individuals or are elicited through survey techniques").
8. *Id.* at 1039–44.
9. Cass R. Sunstein, The Cost-Benefit State: The Future of Regulatory Protection 20 (2002).
10. Stephen Breyer, Breaking the Vicious Circle: Toward Effective Risk Regulation 68–69 (1993).
11. Frank Ackerman & Lisa Heinzerling, Priceless: On Knowing the Price of Everything and the Value of Nothing 8–11 (2004) ("[F]ormal cost-benefit analysis often hurts more than it helps: it muddies rather than clarifies fundamental clashes about values.").
12. Kysar, *supra* note 3, at 20 (arguing that cost-benefit analysis "offers the implicit and misleading message that our needs consist only of better data and more-rigorous techniques of valuation").
13. *See* Jonathan S. Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. Chi. L. Rev. 657, 659–60 (2010) ("[C]ritics have never been very clear about what decision procedure they prefer to CBA.").
14. David M. Driesen, *Distributing the Costs of Environmental, Health, and Safety Protection: The Feasibility Principle, Cost-Benefit Analysis, and Regulatory Reform*, 32 B.C. Envtl. Aff. L. Rev. 1, 9 (2005).
15. Masur & Posner, *supra* note 13 at 704.
16. *See* David M. Driesen, *Should Congress Direct the EPA to Allow Serious Harms to Public Health to Continue?: Cost-Benefit Tests and NAAQS Under the Clean Air Act*, 11 Tul. Envtl. L.J. 217, 220–21 (1998) (noting that in the context of setting the NAAQS, "we must either choose a zero level for pollutants or recognize some element of discretion in deciding what constitutes an adequate margin of safety").

mation on the air pollutant.[17] The primary NAAQS must be set at the level "requisite to protect the public health" with an "adequate margin of safety."[18] The secondary NAAQS must be set at the level "requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air."[19] NAAQS are set uniformly across the entire country.[20] The prohibition on the consideration of costs in the setting of the NAAQS is longstanding, dating back to the D.C. Circuit's 1980 decision in *Lead Industries Association v. EPA*.[21] The court reasoned there that if Congress had intended for EPA "to be concerned about economic and technological feasibility, it [would have] expressly so provided."[22]

In its very first NAAQS proceeding, EPA set the standard decisionmaking template that has remained in place for nearly four decades. In 1978, EPA set the NAAQS for lead, adopting a threshold-based approach that sought to establish "a safe level of total lead exposure."[23] To find the threshold, the agency engaged in a "critical population—critical effect" inquiry, designed to protect the most sensitive individuals from the harmful effect occurring at the lowest concentration. The logic was that if the most sensitive population was protected, everyone else would be protected as well. EPA's analysis contained three principal steps. The first identified a critical effect within a critical population, the second linked that effect with an ambient environmental concentration, and the third identified an averaging methodology for environmental monitoring.

For the first step, EPA chose young children, between the ages of one and five, as the critically sensitive population, and lead-induced elevation of erythrocyte protoporphyrin ("EP elevation") as the critical effect.[24] For the second step, EPA first determined a lead level in blood above which the critical population would suffer from the critical effect, settling on 30 μg/dL.[25] EPA then decided that the standard should keep 99.5% of the target population below 30 μg/dL.[26] EPA found that the necessary target mean population blood lead level to achieve this goal was 15 μg/dL.[27] EPA selected an air-to-blood ratio of 1 to 2, meaning that a 1 μg/m³ increase of the level of lead in air increases the level of lead in blood by 2 μg/dL.[28]

Lead in blood comes not only from exposure to lead in air, but also to lead exposure from non-air sources, such as children ingesting paint chips.[29] So, EPA subtracted the concentration attributable to non-air sources from the total permissible concentration. EPA selected 12 μg/dL as the non-air source contribution to use in the determination of the NAAQS. Subtracting 12 μg/dL from 15 μg/dL left 3 μg/dL as the allowable airborne lead contribution in the blood, which was then divided by 2 (the air-to-blood ratio) arriving at 1.5 μg/m³ as the maximum permissible concentration of lead in air.

At each of these decision points, a higher level of safety could have been achieved. Consider the definition of safe blood levels. To arrive at the target mean, the agency acknowledged that blood lead levels vary across a population and set the mean level so that 99.5% of the population would fall below critical threshold. But the selection of 99.5% represents a choice. The agency instead could have selected 99.9%, or 90%, or any other arbitrary stopping point. At the level selected by EPA, the vast majority of the population, of course, was protected. But 0.5% of the population was not. EPA found that in the population of "children in central urban areas where air lead was at the standard level," 20,605 children would end up with levels of lead in blood above 30 μg/dL.[30]

The agency's other decisions in setting the lead NAAQS have a similar feature. The blood lead level attributable to non-air lead sources is an example. Some of the studies cited by the agency found that the non-air contribution was as high as 14.4 μg/dL.[31] If EPA had selected that value, holding all other parameters constant, 0.6 μg/dL would have been the allowable increment from air sources. With a 1:2 air-to-blood ratio, the standard would be 0.3 μg/m³, five times more stringent than the standard that was eventually adopted. The EPA could also have chosen other, more protective critical population or critical effects. For example, a more sensitive population would probably have consisted of even younger children (perhaps newborns) or children with an additional condition complicating their situation (such as infants suffering from iron deficiency or malnutrition diseases).[32] Each of these alternative populations could have served as a basis for setting the ambient lead standard.

17. 42 U.S.C. §§ 7408(a)(2), 7409(a) (2012).
18. *Id.* § 7409(b)(1).
19. *Id.* § 7409(b)(2). "Welfare" is defined as including, inter alia, "effects on soils, water, crops, vegetation, man-made materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being, whether caused by transformation, conversion, or combination with other air pollutants." *Id.* § 7602(h).
20. In particular, the NAAQS do not take into account local population concentrations or the ease with which ambient concentrations can be achieved. *See* James E. Krier, *The Irrational National Air Quality Standards: Macro- and Micro-Mistakes*, 22 UCLA L. Rev. 323, 323–25 (1974) (stating that NAAQS are uniform and describing a particularly costly application of that rule in Los Angeles).
21. 647 F.2d 1130 (D.C. Cir. 1980).
22. *Id.* at 1148.
23. Lead: Proposed National Air Ambient Air Quality Standard, 42 Fed. Reg. 63,076, 63,079 (proposed Dec. 14, 1977) (to be codified at 40 C.F.R. pt. 50) [hereinafter Lead 1977 Proposed Rule] ("The threshold for a particular health effect is considered to be the blood lead level at which the effect is first detected.").
24. *Id.* at 63,077–78.
25. National Primary and Secondary Ambient Air Quality Standards for Lead, 43 Fed. Reg. 46,246, 46,253 (Oct. 5, 1978) (to be codified at 40 C.F.R. pt. 50) [hereinafter Lead 1978 Final Rule].
26. *See id.* at 46,251 (responding to comments that agency's proposed standard "incorporat[ed] an excessive margin of safety").
27. *Id.*
28. *Id.* at 46,250, 46,254.
29. *See id.* at 46,252–54 (discussing the issue of non-air sources of lead and methodology for calculating air levels).
30. *See id.* at 46,255.
31. *See id.* at 46,254.
32. Some comments noted that "within the general population of children there were subgroups with enhanced risk due to genetic factors, dietary deficiencies, or residence in urban areas." *Id.* at 46,252.

At each stage of its decisionmaking, the agency was faced with choices that would have justified a more stringent standard. If the only relevant factor under consideration was reducing health risks from lead exposure, EPA *would* have selected a more stringent standard. Some countervailing factor must have influenced that agency's decision, but what that factor is cannot be discerned from the administrative record.

This same problem continues to be present. Indeed, in recent rulemakings, the agency acknowledged this difficulty, recognizing that it is required to perform an inquiry that gives it inadequate criteria for a final decision. For example, in setting the 2008 lead standard, EPA recognized that with regards to IQ loss in children, "there are currently no commonly accepted guidelines or criteria within the public health community that would provide a clear basis for reaching a judgment as to the appropriate degree of public health protection that should be afforded."[33] Similarly, in the sulfur dioxide final rule, EPA acknowledged that with regards to the level of exposure, "there is no bright line clearly mandating the choice of level within the reasonable range proposed," but rather the "choice of what is appropriate within this reasonable range is a public health policy judgment."[34] The essence of what EPA calls a "policy judgment" is deciding how many individuals will be left unprotected. Of course, if only public health considerations were relevant, protecting more would always be better. And without considering the non-health consequences of a rule, such as the compliance costs, any decision to leave part of the population unprotected is essentially incoherent.

EPA currently treats each of the six contaminants subject to the NAAQS as non-threshold contaminants. For such contaminants, it is easy to see why EPA cannot make a coherent choice on the basis of health considerations alone. But, as demonstrated above, the problem is not confined to non-threshold contaminants. In 1978, EPA treated lead as a threshold contaminant. Even for pollutants assumed to have a threshold, no non-zero standard would protect every person with absolute certainty. So even for these pollutants, the agency is left with no option but to decide what proportion of the population to place beyond the threshold, exposed to a public health harm. And there is no coherent way to perform this inquiry if health is the only factor that the agency can consider.

In the *American Trucking* litigation, the D.C. Circuit recognized the nature of the stopping point problem and found that EPA lacked guidance for how to determine "how much is too much" pollution under the NAAQS.[35] It sought to resolve this dilemma by finding the statute unconstitutional.[36] The Supreme Court rejected the D.C. Circuit's holding that the NAAQS health-based standard provided the agency with an unconstitutionally broad delegation of power.[37] There is much to recommend in the Court's fairly circumspect interpretation of the nondelegation doctrine, given the reality that in a complex society, substantial discretion for administrative agencies is a necessary fact of life.

The real problem is not the lack of guidance from Congress, but that EPA finds itself actively forbidden from engaging in the kind of balancing inquiry that it must undertake to set any level above zero for non-threshold pollutants in a coherent way. No party was able to propose a test that would allow the agency to stop short of an absolute level of stringency, and yet none of the parties advocated setting the NAAQS at zero, and EPA showed "no inclination to adopt" such a strategy.[38]

Because the agency cannot acknowledge any factor other than health in its analysis, but health alone cannot provide a complete answer to the regulatory question that it faces, it *must* engage in an unacknowledged consideration of non-statutory factors to arrive at a final outcome. There is, therefore, a necessary gap between the actual decisionmaking process and the reasons that the agency may give for its final decision. The unacknowledged consideration of a factor such as cost has obvious negative consequences for the transparency, accountability, and soundness of agency decisionmaking.

III. Inadequacy Paradox

Examining the RIAs accompanying the most recent NAAQS for lead, nitrogen oxide, sulfur dioxide, particulate matter, and ozone for each of the regulated pollutants leads to a striking conclusion, which we dub the inadequacy paradox. It turns out that, despite common conceptions, if the standards had been set according to cost-benefit analysis, they would have been more stringent in all five cases. We present below two examples: the 2008 lead standard and the recent 2015 ozone proposal.[39]

In the regulatory impact analysis of the 2008 lead standard, the agency examined, in addition to the final standard of 0.15 $\mu g/m^3$, both a more stringent level of 0.10 $\mu g/m^3$ and a less stringent alternative of 0.40 $\mu g/m^3$. The estimates of costs and benefits varied greatly. Two factors drove this variation. First, the discount rate had a large effect on the value assigned to IQ gains from the new standard. For example, as Table 1 on the next page shows, using a 3% discount rate, the yearly benefits of the final standard were found to range between \$3,700 million and \$6,900 million; using a 7% discount rate, the benefits were

33. National Ambient Air Quality Standards for Lead, 73 Fed. Reg. 66,964, 66,997 (Nov. 12, 2008) (to be codified at 40 C.F.R. pts. 50–51, 53, 58).
34. Primary National Ambient Air Quality Standard for Sulfur Dioxide, 75 Fed. Reg. 35,520, 35,546 (June 22, 2010) (to be codified at 40 C.F.R. pts. 50, 53, 58).
35. American Trucking Ass'ns v. EPA, 175 F.3d 1027, 1034 (D.C. Cir. 1999), *rev'd sub nom.* Whitman v. American Trucking Ass'ns, 531 U.S. 457 (2001).
36. 175 F.3d at 1034-40.
37. *See* Whitman v. American Trucking Ass'ns, 531 U.S. 457 (2001) (holding that "the scope of discretion §109(b)(1) allows is in fact well within the outer limits of our nondelegation precedent").
38. 175 F.3d at 1034.
39. The full analysis for the five NAAQS with the relevant data is included in the original article.

Table 1: Cost-Benefit Analysis of the Lead 2008 Standards (Millions of 2006$)

	Less stringent alternative: 0.4 μg/m³		Final standard: 0.15 μg/m³		More stringent alternative: 0.1 μg/m³	
	3% Discount rate	7% Discount rate	3% Discount rate	7% Discount rate	3% Discount rate	7% Discount rate
Range of benefits	2,100–3,700	350–1,300	3,700–6,900	650–2,600	4,800–8,600	800–3,100
Benefits midpoint	*2,900*	*825*	*5,300*	*1,625*	*6,700*	*1,950*
Range of costs	50–430	61–510	150–2,800	170–3,200	190–3,500	210–4,100
Costs midpoint	*240*	*285*	*1,475*	*1,685*	*1,845*	*2,155*
Net benefits midpoint	*2,660*	539	3,825	-60	4,855	-205
Midpoint of 3% and 7% net benefits	1,600		1,882		2,325	

estimated to be between $650 million and $2,600 million per year. The second factor was the methodology used by EPA to extrapolate the costs of emissions reductions where no existing technology was available to meet the standard. One method resulted in a relatively low estimate of between $150 million and $170 million for the final standard.[40] A second method, based on an average cost per microgram of air quality improvement at seven monitor areas, resulted in a substantially higher estimate of $2,800 million to $3,200 million.[41]

Analyzing the net benefits reveals the following results. For the 7% discount rate, the less stringent alternative of 0.4 μg/m³ has higher net benefits: $539 million compared to $(-60) million for the final standard, or ($-205) million for the more stringent alternative of 0.1 μg/m³. In contrast, for the 3% discount rate, increasing the stringency of the standard also increases the net benefits. The net benefits of the less stringent alternative are $2,660 million, as compared to net benefits of $3,825 million for the final standard and $4,855 million for the more stringent alternative.

Table 2: Cost-Benefit Analysis of Ozone 2015 Standards (Billions of 2011$)

	Final standard: 70 ppb		More stringent alternative: 65 ppb	
	w/o CA	CA	w/o CA	CA
Range of benefits	2.9–5.9	1.2–2.1	15–30	2.3–4.2
Benefits midpoint	*4.4*	*1.65*	*22.5*	*3.25*
Costs	1.4	0.8	16	1.5
Net benefits midpoint	*3*	*0.85*	*6.5*	*1.75*

And, likewise, when looking at the midrange of the 3% and 7% scenarios, the more stringent alternative yielding $2,325 in net benefits dominates both the final standard and the less stringent alternative, which yield $1,883 million and $1,600 million in net benefits, respectively.

As Table 2 shows, for its recent ozone standard, the agency evaluated both its final standard of 70 ppb as well as a more stringent alternatives of 65 ppb.[42] The agency broke out California from the rest of the nation, based on the longer expected time frame of emissions reductions in that state, which creates the potential for double counting (both costs and benefits) if California air quality improves based on other regulatory programs.[43] We similarly break out California, and, as the agency did, treat the state separately.[44] EPA calculates the estimated effects of the rule in 2015. Costs are discounted at 7% and in EPA's primary report benefits are discounted at the same rate. Although the agency also calculates benefits at the 3% rate (which increases the net benefits of the proposal) we likewise focus on the 7% discount rate. As with the lead standard, we take the midpoints of the range of benefits to calculate the net benefits of the final standard and the alternative.

Based on the agency's analysis, a more stringent standard would be justified. Examining the nationwide estimates, the 70ppb standard generates between $2.9 billion and $5.9 billion in benefits, while the 65ppb alternative increase the net benefits to the range of $15 billion to $30 billion. These increased benefits are not free, costing approximately $18 billion, but nevertheless, using the midpoint of the benefits estimate, the more stringent standard delivers $3.5 billion more in net benefits. Looking to California, the net benefits of the more stringent standard would have been roughly double the final standard.

At least for several of the NAAQS, the most straightforward explanation of the fact that the

40. *See* U.S. EPA, Regulatory Impact Analysis for the Proposed Revisions to the National Ambient Air Quality Standards for Lead, Table ES-2 at ES-11 (Oct. 2008); *id*. at 6-15 to 6-16 (describing cost-curve approach).
41. *Id*. at 6-18 to 6-20.
42. The original version of this article analyzed the 2008 ozone rule because, at the time of publication, it was the most recent version. U.S. EPA, Final Ozone NAAQS Regulatory Impact Analysis, EPA-452/R-08-003, ES 4-5 (Mar. 2008) [hereinafter Ozone 2015 Final RIA]. The RIA for that rule found, contrary to the general trend discussed above, that the standard selected by EPA was inefficiently *stringent*. In 2015, EPA finalized an updated ozone standard that relied on new estimates of costs and benefits. In particular, new cost estimates were used that were substantially lower than in the 2008 rule. U.S. EPA, Final Ozone NAAQS Regulatory Impact Analysis, EPA-452/R-15-007 (Sept. 2015).
43. *Id*. at ES-17.
44. *Id*.

agency has adopted inefficiently weak standards is that ancillary benefits are not taken into account in the criteria documents used to establish allowable pollution levels.[45] For several of the NAAQS, there are important categories of co-benefits because reductions in one type of pollutant leads to reductions in other pollutants. For example, in the ozone NAAQS, EPA estimates that between 66 and 71 percent of the total health benefits arises from reductions in particulate matter that will come about from the rule, rather than direct ozone benefits.[46] If the ancillary effects of more stringent regulation are systematically more likely to be positive rather than negative, there would be a bias toward overly weak health-based standards, which do not account for ancillary effects, compared to cost-benefit analysis, which does.

EPA's approach seems to run counter to OMB's Circular A-4. Adopted in 2003, when John Graham was the OIRA Administrator, it requires agencies to take into account both countervailing risks and ancillary benefits in performing cost-benefit analyses that accompany "significant" regulations. But neither OMB nor any other government actor extended the logic of Circular A-4 to EPA's criteria documents, perhaps due to the common view that *American Trucking* prohibits all cost considerations when setting the NAAQS.

Uncertainty aversion provides another possible explanation for why the NAAQS are suboptimally lax. In setting the NAAQS, EPA purportedly relies only on information about the health consequences of pollution. But even though it is not allowed to explicitly consider costs that the NAAQS would impose on regulated industry, the agency nonetheless worries about imposing excessive costs. For example, in setting the NAAQS for lead in 1977, EPA acknowledged that certain types of facilities might be "severely strained both technically and economically in achieving emission reductions that may be required in implementing the proposed air quality standard."[47] In selecting the non-air contribution, it rejected a choice on the high part of the range, noting that it would produce an "exceptionally stringent standard,"[48] which presumably would be a bad thing only if it was too costly. More generally, as George Eads pointed out, the agency cannot afford to ignore the "enormous potential economic consequences" of its standards.

45. *See, e.g.*, U.S. EPA, Air Quality Criteria for Particulate Matter (Final Report), EPA 600/P-99/002aF-bF (Oct. 2004); U.S. EPA, Integrated Science Assessment for Oxides of Nitrogen—Health Criteria (Final Report), EPA/600/R-08/071 (July 2008). Even when EPA considers possible interactions among pollutants, it does not evaluate the ancillary benefits. *See* U.S. EPA, Integrated Science Assessment (ISA) for Sulfur Oxides—Health Criteria (Final Report), EPA/600/R-08/047F at 3-8, 3-9, 3-28 (Sept. 2008).

46. Ozone 2015 Final RIA, *supra* note 42, at E-14.

47. Lead 1977 Proposed Rule, *supra* note 23, 63,082.

48. Lead 1978 Final Rule, *supra* note 25, at 46,254.

IV. Toward a New Approach

Health-based standards are likely to be a persistent feature of U.S. environmental law, particularly given the current congressional paralysis. But EPA does not need to continue promulgating NAAQS in a way that results in levels of protection that are less stringent than those that would result from the application of cost-benefit analysis. We argue, instead, that EPA has the discretion to use cost-benefit analysis as a regulatory floor, and that it should exercise this discretion.

At first glance, this approach might appear to be precluded by the Supreme Court's decision in *American Trucking*. This case, however, was litigated in a context in which all the parties on both sides argued that the application of cost-benefit analysis would result in less stringent standards and in which the Court accepted this characterization. No industrial group or trade association argued that cost-benefit analysis should be prohibited, and no environmental group argued it should be allowed. These groups would not have taken their respective positions had they not believed that cost-benefit analysis would lead to less stringent levels of regulation. Moreover, the Court itself assumed that the consideration of costs would lead to less stringent standards. Justice Scalia's majority opinion notes that the "cost of implementation . . . is so full of potential for canceling the conclusions drawn from direct health effects that it would surely have been expressly mentioned in §§ 108 and 109 had Congress meant it to be considered."[49]

As a result of the way in which the arguments were presented to the Court and the way in which the Court dealt with these arguments, the holding of *American Trucking* should be characterized as precluding the consideration of costs only in instances when doing so would lead to less stringent standards than the ones determined solely through reliance on public health considerations. The holding should not be extended to the opposite situation, which is the focus of this Article, in which the consideration of costs would lead to more stringent standards. With respect to this situation, the statute should be characterized as being silent. Typically, in the case of statutory silence, an agency's interpretation of the statute that Congress has empowered it to administer is entitled to Chevron deference.[50]

Under Executive Order 12,866, administrative agencies are required to justify regulatory decisions through the application of cost-benefit analysis except where such consideration is "prohibited by law."[51] Under the interpretation of *American Trucking* that this Article advocates, EPA would be required to first determine, as currently, what NAAQS is appropriate on the basis of public health considerations alone. Next it would look at the cost-bene-

49. Whitman v. American Trucking Ass'ns, Inc., 531 U.S. 457, 469 (2001).

50. *See* Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837, 842-44 (1984); Thomas W. Merrill & Kristin E. Hickman, *Chevron's Domain*, 89 Geo L.J. 833, 833 (2001).

51. Exec. Order No. 12,866, 58 Fed. Reg. 51,753 (1993) (Clinton Administration).

fit analysis, which is already prepared in the RIAs during the regulatory proceedings.[52] It would then pick the more stringent of the standards justified by heath-based inquiry and cost-benefit analysis, respectively. In the former case, EPA would not modify its health-based approach, pursuant to the *American Trucking* holding. But in the latter case, it would be required by the Executive Order to make the standard more stringent. This approach would likely lead to more stringent NAAQS for all pollutants currently regulated under the program.

V. Conclusion

In this Article, we have shown that the centerpiece of the Clean Air Act—the National Ambient Air Quality Standard program—exhibits two serious pathologies. The first is the stopping point problem. In setting such standards, EPA cannot provide a coherent explanation for why it did not pick a more stringent alternative, given that public health considerations are the only legally cognizable factors that it can take into account under the current interpretation of the law. This problem, which is most clear in the case of non-threshold pollutants, manifests itself for threshold pollutants as well.

Moreover, a widely held assumption that we debunk in this Article had been that health-based standards like the NAAQS would lead to more stringent standards than would the application of cost-benefit analysis. We show that, for the NAAQS, the reality has generally been the opposite, giving rise to the inadequacy paradox.

The universally accepted consensus is that the Supreme Court's decision in *American Trucking* stands in the way of a solution, even a partial solution, to these problems by precluding the consideration of costs in setting the NAAQS. We argue, in contrast, the a proper understanding of this decision would permit the use of cost-benefit analysis when it would lead to more stringent standards than those derived from health-based considerations alone. This one-way ratchet solves the inadequacy paradox. As a result, the NAAQS would never be less stringent than the welfare maximizing standards. In addition, because cost-benefit analysis would be the operative standard for many (if not all) of the NAAQS, the scope of the stopping point problem would be greatly reduced, even if it remained a background conceptual concern.

52. *See supra* note 4.