The Real World of Cost-Benefit Analysis: Thirty-Six Questions (and Almost As Many Answers)

Cass R. Sunstein[*]

Abstract

Some of the most interesting discussions of cost-benefit analysis focus on exceptionally difficult problems, including catastrophic scenarios, "fat tails," extreme uncertainty, intergenerational equity, and discounting over long time horizons. As it operates in the actual world of government practice, however, cost-benefit analysis usually does not need to explore the hardest questions, and when it does so, it tends to enlist standardized methods and tools. It is useful to approach cost-benefit analysis not in the abstract but from the bottom up, that is, by anchoring the discussion in specific scenarios involving trade-offs and valuations. Thirty-six stylized scenarios are presented here, alongside an exploration of how they might be handled in practice. Open issues are also discussed.

> The world of costs and benefits (which includes taking note of the badness of nasty actions and of violations of freedom and rights) is quite a different decisional universe from the sledgehammer reasoning of consequence-independent duties and obligations.
>
> -- Amartya Sen[1]

I.   On (Not) Admiring the Problem

When I was in government, a colleague had an unusual and constructive phrase. After lengthy and intense discussions of options, and of the difficulties associated with each, he would respond, "Ok, we have now admired the problem. What are we going to do about it?" The response was important, because it shifted the group's attention from people's concerns, worries, and objections, and toward exactly what was needed, which was a sense of the best, or the least bad, solutions.

---

[*] Robert Walmsley University Professor, Harvard University. The author was Administrator of the Office of Information and Regulatory Affairs from September 2009 to August 2012. Although this essay draws on what the author learned in that time, it relies on public documents. Nothing here represents an official position in any way. I am grateful to Eric Posner, Adrian Vermeule, and David Weisbach for helpful comments on a previous draft.

[1] Amartya Sen, The Discipline of Cost-Benefit Analysis, in Amartya Sen, Rationality and Freedom 553, 561 (2002).

1

The word of regulation is full of admirable problems. For example, there is an elaborate literature on the problems of risk and uncertainty, and also on how regulators should deal with them.[2] Situations of risk exist when we can identify outcomes and assign probabilities to each of them.[3] Situations of uncertainty exist when it is possible to identify outcomes but not to assign probabilities.[4] Both situations create serious challenges for regulators.[5] We can imagine, for example, a regulation for which estimates of both benefits and costs span a wide range. Perhaps regulators cannot identify the probabilities that ought to be assigned to various points along the continuum. Even if they can do so, it may not be self-evident what ought to be done when benefits exceed costs at some points within the respective ranges, but fail to do so at others.

We can easily imagine cases in which there is a risk of catastrophe – involving, say, climate change, financial meltdowns,[6] and terrorist attacks – but in which regulators cannot specify the relevant probabilities, or identify the contribution of the particular regulation to reducing the central risks.[7] We can imagine cases with "fat tails," perhaps confounding cost-benefit analysis, perhaps suggesting that the quantified benefits of risk reduction are far higher than we initially anticipated.[8] We can imagine cases in which the discount rate greatly matters, so that a regulation is justified with a low rate, but not with a high one.[9] We can imagine cases in which certain benefits, such as protection of privacy and prohibition on the denial of health insurance to those with preexisting conditions, are hard to quantify and monetize.

All of these are admirable problems, and it is admirable, and sometimes highly illuminating, to admire them. Indeed, the admiration may well be a necessary precondition for deciding how to handle them. But the act of admiring problems has its own benefits and costs. One benefit, of course, is improved understanding, which is a good in itself. Another benefit is improved practice and policies. A cost is associated with the very effort to resolve difficult and potentially intractable problems – a cost that may loom especially large if those problems do not arise often. With respect to both practice and policies, it is important to understand the extent to which answers to the hardest and most interesting questions will actually matter, and how, and when.

---

[2] For relevant discussion, see RICHARD POSNER, CATASTROPHE: RISK AND RESPONSE (2005); CASS R. SUNSTEIN, WORST-CASE SCENARIOS (2007); Martin Weitzman, *Why the Far-Distant Future Should Be Discounted at Its Lowest Possible Rate*, 36 J. ENVTL. ECON. & MGMT. 201 (1998).

[3] *See* FRANK KNIGHT, RISK, UNCERTAINTY, AND PROFIT (1921).

[4] *See id.* For relevant discussion, with references to the economic and philosophical literature, see Posner, *supra* note; Sunstein, *supra* note.

[5] *See* KNIGHT, *supra* note. We can also imagine problems of "ignorance," for which neither outcomes nor probabilities can specified.

[6] Some of the regulations required by Dodd-Frank are designed to reduce risks of financial catastrophe, but it may be difficult to quantify the contribution that a particular regulation will make to reducing that risk.

[7] *See* POSNER, *supra* note.

[8] *See* Martin L. Weitzman, *Additive Damages, Fat-Tailed Climate Dynamics, and Uncertain Discounting*, 3 ECON.: OPEN-ACCESS, OPEN-ASSESSMENT E-J. 2009-39, *available at* http://dx.doi.org/10.5018/economics-ejournal.ja.2009-39

[9] For valuable discussion, see CHRISTIAN GOLLIER, PRICING THE PLANET'S FUTURE: THE ECONOMICS OF DISCOUNTING IN AN UNCERTAIN WORLD (2012).

2

From 2009 to 2012, I was privileged to serve as Administrator of the Office of Information and Regulatory Affairs, and in that capacity to help oversee the issuance of over 2000 regulatory actions.[10] In the process, I helped to implement Executive Order 13563, a kind of mini-constitution for the regulatory state, an immensely important document that places a high premium on analysis of costs and benefits.[11] Under that Executive Order, agencies may proceed only if the benefits justify the costs and only if the chosen approach maximizes net benefits (unless the law requires otherwise).[12] A key provision of that Executive Order states that "each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible."[13]

This language reflects an unprecedented emphasis on the importance of quantification – an emphasis reflected in the fact that in the Administration's first three years, the net benefits of economically significant regulations under President Obama exceeded $91 billion, more than twenty-five times the corresponding figure under President George W. Bush, and more than six times the corresponding figure under President Clinton.[14] Indeed, those benefits rose to $150 billion for the first four years.[15] At the same time, Executive Order 13563 recognizes that some values are difficult or impossible to quantify, including "human dignity," and it authorizes agencies to consider those values where appropriate and consistent with law.[16] As we shall see, these provisions have proved relevant in several cases.[17]

During my period in government, a high percentage of the most admirable problems came to my attention. In fact I do not believe that any of the problems I have sketched did not come across OIRA's viewscreen at one time or another. To take just one example, I participated in an interagency working group that settled on values for the social cost of carbon.[18] In 2010 dollars, the central value is $21.40 per ton, with a range

---

[10] OIRA reviewed 2304 regulatory actions from January 21, 2009 (when I began as Senior Advisor to the Director of OMB) to August 10, 2012 (when I left the federal government); it reviewed 1,989 regulatory actions from the date of my confirmation (September 10, 2009) to August 10, 2012. This information is available on reginfo.gov.

[11] *See* Exec. Order 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011).

[12] *Id.*

[13] *Id.*

[14] OFFICE OF MGMT. & BUDGET, 2012 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS AND UNFUNDED MANDATES ON STATE, LOCAL, AND TRIBAL ENTITIES 54, *available* http://www.whitehouse.gov/sites/default/files/omb/inforeg/2012_cb/2012_cost_benefit_report.pdf.

[15] The draft 2013 Report shows net benefits, for the first four fiscal years, of $159 billion. OFFICE OF MGMT. & BUDGET, 2013 DRAFT REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS AND UNFUNDED MANDATES ON STATE, LOCAL, AND TRIBAL ENTITIES 64, available at http://www.whitehouse.gov/sites/default/files/omb/inforeg/2013_cb/draft_2013_cost_benefit_report.pdf

[16] *See* note supra.

[17] For more detailed discussion, see Cass R. Sunstein, Nonquantifiable, forthcoming California L. Rev. (2014), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2259279

[18] *See* INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, U.S. GOVT., TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS, *available at* http://www.epa.gov/oms/climate/regulations/scc-tsd.pdf. *See also* Michael Greenstone et al., *Estimating the Social Cost of Carbon for Use in U.S. Federal Rulemakings* (Mass. Inst. Tech. Dep't of Econ., Working

3

from \$4.70 to \$64.90.[19] (See Appendix A.) These values are used to establish the benefits of regulatory efforts to reduce greenhouse gas emissions, and they have played a significant role in many rulemakings.[20]

It is also true, however, that the most difficult problems appeared quite rarely, and when they did, there were generally standardized methods of handling them. OMB Circular A-4, issued in 2003, outlines many of those methods,[21] and I shall be relying on that document for some of the discussion here. One of my central points is that the analysis of the social cost of carbon, Circular A-4, and similar or related documents are binding until they are changed, and for that reason, some of the hardest questions cannot be revisited during the process of rule review. To be sure, authoritative documents can be altered. But their alteration requires some kind of formal process, requiring significant time, effort, and commitment from a large number of public officials, and perhaps a period of public comment as well.[22] Any such process will need a substantial investment of resources. For this reason, it is no light thing to attempt a revision of authoritative documents, which have survived a high degree of both internal and external scrutiny. Agencies and departments (including OIRA and others within the Executive Office of the President) may not reject such documents, in whole or in part, in the context of particular rules.

I shall be relying here on existing public documents and understandings, informed by my own experience. The analysis of costs and benefits is an important part of what is often described as "OIRA review." In reality, such review is not merely OIRA review but emphatically interagency review, involving many public officials, prominently including those who work at the Council of Economic Advisers (CEA) and the National Economic Council (NEC).[23] The judgments and conclusions described here are an outgrowth of that

---

Paper No. 11-04, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1793366. For assessments, see William Nordhaus, *Estimates of the Social Cost of Carbon* (Cowles Found., Discussion Paper No. 1826, 2011), *available at* http://dido.econ.yale.edu/P/cd/d18a/d1826.pdf; Jonathan Masur & Eric Posner, *Climate Change and the Limits of Cost-Benefit Analysis*, 99 CAL. L. REV. 1557 (2011).

[19] INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, *supra* note, at 28.

[20] For example, the social cost of carbon was used in rules involving greenhouse gas emissions and fuel economy for light vehicles and for heavy vehicles, and also in rules involving energy efficiency for a range of appliances, including small motors and refrigerators. *See, e.g.*, Light-Duty Vehicle Greenhouse Gas Emission Standards, 75 Fed. Reg. 25,324, 25,520–524 (May 7, 2010) (to be codified at 49 C.F.R. pts. 531, 533, 536, 537, 538); Energy Conservation Standards for Residential Refrigerators, Refrigerator-Freezers, and Freezers, 76 Fed. Reg. 57,516, 57,559–57,561 (Sept. 15, 2011) (to be codified at 10 C.F.R. pt. 430).

[21] OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, CIRCULAR A-4, REGULATORY ANALYSIS (2003), *available at* http://www.whitehouse.gov/omb/circulars_a004_a-4 [hereinafter OMB CIRCULAR A-4]. The Obama Administration issued several documents that offer significant clarifications. *See* OFFICE OF INFO. AND REGULATORY AFFAIRS, REGULATORY IMPACT ANALYSIS: A PRIMER, *available at* http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf; OFFICE OF INFO. AND REGULATORY AFFAIRS, REGULATORY IMPACT ANALYSIS: FREQUENTLY ASKED QUESTIONS (2011), *available at* http://www.whitehouse.gov/sites/default/files/omb/assets/OMB/circulars/a004/a-4_FAQ.pdf.

[22] For example, Circular A-4 resulted from an extensive process that involved both peer review and public comment.

[23] A detailed account can be found in CASS R. SUNSTEIN, THE OFFICE OF INFORMATION AND REGULATORY AFFAIRS: MYTHS AND REALITIES, 126 HARV. L. REV. 1838 (2013).

process of interagency review, undertaken in the shadow of authoritative documents. I will use the term "OIRA review" in several places, but it should be understood throughout that this process involves a large number of offices, and of these, OIRA may be far from the most important. When it is working well, the process of OIRA review is a concrete exemplification of the idea of "government by discussion," which puts a high premium on the exchange of reasons in the public sphere, and which therefore acts as a safeguard against error.[24]

A few institutional clarifications: Some of the discussion explores the question whether an agency will be authorized to proceed. Under Executive Orders 13563 and 12866, executive agencies[25] must submit all significant rules to OIRA, and those rules may not be published in the Federal Register until OIRA has "concluded review." Sometimes regulatory actions are under OIRA review for long periods, perhaps even a year or more.[26] Agency heads, including heads of Cabinet departments, fully understand the relevant requirements. While interagency discussions can contain a measure of substantive disagreement, and while those disagreements may not be simple to resolve, the process itself is one that all parties accept – which may be unsurprising in light of the fact that since the Reagan Administration, all presidents, whether Republican or Democratic, have essentially committed themselves to that process.

There are well-established channels for resolving continuing or serious disagreements, with the President as the ultimate arbitrator.[27] In addition, the OIRA process is subject to law, and when Congress has said that agencies must move forward with a particular approach, or that costs are not relevant, its will is controlling insofar as it is expressed in law. Everything said here is subject to an important general proviso: "to the extent permitted by law."

Nor do I attempt here to provide any kind of justification of cost-benefit analysis, or to explore how it might be defended against its critics.[28] The central idea is that an analysis of costs and benefits can help to ensure that regulation actually promotes social welfare,[29] but this idea raises a host of further questions.[30] My goal is not to answer those

---

[24] See Amartya Sen, The Idea of Justice 324-27 (2009).

[25] Hence independent agencies are not subject to the process of OIRA review – a longstanding exclusion, beginning with President Reagan's Executive Order 12291, issued in 1981. Note, however, that an important executive order from President Obama states that independent agencies "should" follow certain principles laid out in Executive Order 13563. *See* Exec. Order 13579, 76 Fed. Reg. 41,587 (July 11, 2011).

[26] For an example, see http://www.publicintegrity.org/2013/05/13/12649/chemicals-concern-list-still-wrapped-omb-red-tape. For an explanation see Sunstein, Myths and Realities, supra note, and particularlyp. 1847 note 39.

[27] *See* Sunstein, *supra* note, and particularly the discussion of "elevation."

[28] Simpler, supra note, attempts to provide such a justification. See also Matthew D. Adler and Eric Posner, New Foundations of Cost-Benefit Analysis (2006): Matthew D. Adler, Well-Being and Fair Distribution: Beyond Cost-Benefit Analysis (2011).

[29] See Simpler, supra note; Adler and Posner, supra note. See also Amartya Sen, The Discipline of Cost-Benefit Analysis, in Rationality and Freedom 553 (2002), and particularly the suggestion that with its emphasis on "explicit valuation, broadly consequentialist reasoning, and additive accounting . . . general cost-benefit analysis is a very ecumenical approach. It is compatible, for example, with weights based on willingness to pay as well as some quite different ways of valuation (for example, through questionnaires),

questions but to explain the existing framework, with reference to authoritative documents and its likely operation in different contexts.

The remainder of this essay has a simple structure. I divide the thirty-six scenarios into eight categories, starting with the basics, and turning respectively to valuations of mortality risks; cobenefits and risk-risk tradeoffs; wide ranges; benefits that are hard or impossible to quantify[31]; net benefits; climate change; and discount rates. Each of the scenarios is brisk and highly stylized. A full picture would of course include not only a description of the various dollar figures, but also an understanding of what, concretely, those figures mean. To enable readers to compare the stylized scenarios with reality, Appendix B provides actual cost-benefit figures from a wide range of recent regulations.

II. The Basics

1. The annual costs of a regulation are $200 million. The annual benefits are $400 million. There are only two alternatives: issuing or not issuing the regulation.[32] In the process of OIRA review, the numbers will be carefully scrutinized, and many questions will be asked about their accuracy and meaning, but if those questions have good answers, this is an easy one in favor of proceeding.[33] The regulation also has the standard characteristic of most economically significant regulations[34] that agencies submit to OIRA: If both benefits and costs are monetized, the monetized benefits are usually significantly higher than the monetized costs.[35] For regulations that are submitted to OIRA or published in the Federal Register, and for which benefits and costs are

---

which may supplement or supplant the willingness-to-pay framework." Id. at 562-63.

[30] See Adler, supra note; Amartya Sen, The Discipline of Cost-Benefit Analysis, in Rationality and Freedom 553 (2002).

[31] See the discussion of the intrinsic value of freedom in id. at 568-69.

[32] This is highly artificial. Typically agencies work to explore more than two alternatives, and the process of interagency review focuses on alternatives as well. See the emphasis on alternatives in Executive Order 13563, 76 Fed. Reg. 3821 (Jan. 18, 2011). Of course the law may narrow the range of available options. Note, however, that Regulatory Impact Analyses frequently discuss alternatives that the law does not permit agencies to select, just as agencies often discuss costs even when they are legally irrelevant. The reason for such discussions is to promote transparency: The public, and relevant policymakers, ought to appreciate these facts even if agencies' hands are tied.

[33] In this and other examples, I focus on total costs and benefits, not marginal costs and benefits. If an alternative approach would deliver $390 million in benefits but cost $50 million, it would have higher net benefits, and would for that reason be preferred under Executive Order 13563. Importantly, agencies must show that the benefits justify the costs and that the chosen approach maximizes net benefits (to the extent permitted by law).

[34] Under Executive Order 13563, incorporating Executive Order 12866, a full regulatory impact analysis is required only for economically significant regulations, which generally qualify as such because they have an impact of $100 million or more per year. For discussion, see Cass R. Sunstein, *The Office of Information and Regulatory Affairs: Myths and Realities*, 126 HARV. L. REV. (forthcoming 2013). For this reason, my focus throughout is on economically significant regulations.

[35] *See* Appendix B. Any of the recent OMB reports on the benefits and costs of federal regulations has the relevant figures. *See, e.g.*, OFFICE OF MGMT. & BUDGET, 2011 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS, *available at* http://www.whitehouse.gov/sites/default/files/omb/inforeg/2011_cb/2011_cba_report.pdf.

monetized, agencies usually find substantial net benefits. (See Appendix B for numerous examples.)

This is hardly an accident.[36] Under Executive Order 13563, the benefits must "justify" the costs, and while I shall spend some time with that idea,[37] the easiest way to show justification is to establish that the monetized benefits are simply higher than the monetized costs. If the monetized benefits are lower than the monetized costs, agencies may choose not to submit the draft rule at all, unless there are special considerations (such as a legal obligation or important nonquantifiable benefits[38]). If the costs exceed the benefits, agencies might devote their resources to other rules, or work to identify an approach for which benefits exceed costs. As Appendix B reveals, *the monetized benefits exceeded the monetized costs for the vast majority of recent economically significant rules for which agencies monetized both benefits and costs*.

2.   Same as (1), but the agency provides a benefits range of $400 million to $700 million. There are only two alternatives: issuing or not issuing the regulation.[39] This is also likely to be an easy one in favor of proceeding. To be sure, the process of OIRA review (again involving a large number of officials) will devote considerable attention to the sheer width of the benefits range. Why is the agency unable to narrow the range? Do the uncertainties involve economics? Do they involve science[40]? A great deal of time might be spent on these questions, in an

---

[36] Note also that the numbers are subject to considerable internal and external scrutiny, *see* Sunstein, *supra* note, and there is no evidence that agencies systematically skew them in self-serving directions, *see* CASS R. SUNSTEIN, SIMPLER: THE FUTURE OF GOVERNMENT (2013). Hence there is no support for the view that the numbers are unreliable because agencies are regularly attempting to support decisions made by political leaders. Nonetheless, ex ante and ex post numbers often differ, and it remains important to continue to scrutinize rules on the books and to reassess them in light of that scrutiny. This is a central goal of Executive Order 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011). and in particular the important requirement of a periodic "regulatory lookback" at rules on the books. *See id.*

[37] See cases below.

[38] See Cass R. Sunstein, Nonquantifiable, Cal L Rev (forthcoming 2013).

[39] *See* note *supra*.

[40] Note, for example, that in the domain of regulations that reduce particulate matter emissions, the benefits range tends to be very large, because of competing scientific studies. See, e.g., U.S. Envtl. Prot. Agency, Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards ES-1 (2011), *available at* http://www.epa.gov/mats/pdfs/20111221MATSfinalRIA.pdf: "EPA estimates that this final rule will yield annual monetized benefits (in 2007$) of between $37 to $90 billion using a 3% discount rate and $33 to $81 billion using a 7% discount rate. The great majority of the estimates are attributable to co-benefits from 4,200 to 11,000 fewer PM2.5-related premature mortalities." For discussion, see Art Fraas and Randall Lutter, Uncertain Benefits Estimates for Reductions in Fine Particle Concentrations, 22 Risk Analysis 434 (201); Fraas and Lutter, Reply, available at http://www.rff.org/Documents/Publications/FL-Reply-to-Fann-et-al-RA-2013.pdf

     For greenhouse gas emissions, there is also a range of values for the social cost of carbon, from $5.30 to $69.70 in 2013 dollars. *See* INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, U.S. GOVT., TECHNICAL SUPPORT DOCUMENT, *supra* note, at 39; Appendix A.

effort to promote a better understanding, within the federal government and within the public at large, of the likely effects of the regulation. One goal will be to narrow the range, to the extent that doing so reflects the best available evidence.[41] But on the facts as stated, it seems clear that the agency ought to proceed.

3. The annual costs of a regulation are $200 million. The annual benefits range from $50 million to $75 million. Unless the law requires the agency to proceed, or unless the regulation has some special feature,[42] the agency is unlikely to attempt to go forward with this regulation. If it submits the rule to OIRA, many questions will be asked, for one simple reason: Executive Order 13563 requires the benefits to justify the costs. If the monetized benefits are much lower than the monetized costs, it may nonetheless be possible to show that the benefits "justify" the costs; perhaps nonquantifiable benefits are anticipated to be large and to provide that justification. But this will not be easy to establish.[43]

4. The annual costs of a regulation are $200 million. The benefits range from $50 to $205 million. The agency invokes the Precautionary Principle[44] and contends that because the benefits justify the costs at the highest end of the range, it should be entitled to go forward. This claim will be met with many questions. It is noteworthy, and revealing, that the Precautionary Principle does not appear in the governing Executive Orders; cost-benefit balancing is endorsed instead. The agency will therefore be required to show that the benefits justify the costs, and because the costs exceed the benefits for most of the range, it will not be easy for it to do so.

There are, however, several possibilities. If the statute requires the agency to proceed, or if it forbids consideration of costs, the question may well be at an end; agencies must follow the law. And if the agency can show that the high-end estimate is by far the most probable, so that the expected value of the rule exceeds $200 million, the benefits would appear to justify the costs. If the agency can show that the rule would produce significant nonquantifiable benefits, it may be able to proceed even if, taking account solely of quantified benefits, the expected value of the rule is negative.[45] But on the facts as stated, there will be many questions in the review process.

III. Valuation of Mortality Risks

---

[41] *See* Exec. Order 13563, section 1, 76 Fed. Reg. 3821 (Jan. 18, 2011).
[42] Discussed in various cases below.
[43] See cases below for further discussion.
[44] For discussion, see CASS R. SUNSTEIN, LAWS OF FEAR (2007).
[45] See cases below.

5.   The annual costs of a regulation are $200 million. The regulation is expected to prevent forty premature deaths. The agency uses $7 million as the value of a statistical life (VSL), and therefore estimates the benefits as $280 million. In the absence of various imaginable problems,[46] the regulation will likely go forward, because $7 million is within the range recommended by OMB for the VSL,[47] and also within the range suggested by the current technical literature.[48] Note in this regard that the Department of Transportation, building on that literature, adopted a revised estimate of $9.1 million in 2013, with suitable adjustments for future years.[49]

An important clarification: With these values, the government is not actually "valuing life." It is valuing the reduction of mortality risks – typically by eliminating low-level risks, for example risks of 1 in 100,000. When it is said that a life is "worth" $7 million in such cases, what is really meant is that people are willing to pay, or ask to be paid,[50] $70, on average, to eliminate a risk of 1 in 100,000. Instead of valuing lives, or even statistical lives, the government is valuing statistical mortality risks.

6.   The annual costs of a regulation are $200 million. The regulation is expected to prevent ten premature deaths. The agency contends that the VSL is $21 million and that the regulation is therefore justified. The regulation is not likely to proceed (unless some statute says that it must). The $21 million figure is inconsistent with OMB guidance, which has a recommended ceiling of $10 million,[51] and is in any case well outside of the range of the technical literature, which shows little support for values as high as $21 million. The agency will have to produce a special justification to go forward, and it will not be easy for it to do so. And indeed, this example is wildly hypothetical, because no

---

[46] For example, the numbers might not reflect reality, or there might be another approach with higher net benefits.

[47] Circular A-4 recommends a range of $1 million to $10 million. *See* OMB CIRCULAR A-4, *supra* note.

[48] *See, e.g.*, W. Kip Viscusi & Joseph Aldy, *The Value of a Statistical Life*, 27 J. RISK & UNCERTAINTY 5 (2003); W. Kip Viscusi, *The Heterogeneity of the Value of A Statistical Life*, 40 J. RISK & UNCERTAINTY 1 (2010) (noting median value of $7 million to $8 million).

[49] http://www.dot.gov/sites/dot.dev/files/docs/DOT%202013%20Signed%20VSL%20Memo.pdf

[50] There is a well-known disparity between "willingness to pay" and "willingness to accept," with the latter number typically being higher. *See, e.g.*, Cass R. Sunstein, *Endogenous Preferences, Environmental Law*, 22 J. LEGAL STUD. 217 (1993). To the extent that labor market studies are used to determine VSL, agencies are relying on willingness to accept. Note in addition that the two figures do not appear to diverge in this context. Thomas Kniesner et al., Willingness to Accept Equals Willingness to Pay for Labor Market Estimates of the Value of Statistical Life (2012), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2221038. There is, however, an unresolved question about whether bounded rationality of various sorts – for example, unrealistic optimism, see Tali Sharot, The Optimism Bias (2010) – might "impeach" the numbers that emerge from revealed preference studies.

[51] *See* OMB CIRCULAR A-4, *supra* note.

agency now uses a VSL in the vicinity of $21 million.[52]

7.   Under Approach A, the annual costs of a regulation are $200 million. Under that approach, the regulation will save fifty-one lives annually. Under Approach B, the annual costs of the regulation are $300 million, and the regulation will save sixty lives annually. If a statistical life is valued at $4 million, Approach A is justified by the monetized figures, and Approach B is not. If a statistical life is valued at $7 million, both approaches are justified, and Approach B is better, because it has significantly higher net benefits. Because the technical literature supports a VSL of $7 million or higher,[53] there is likely to be a great deal of interagency interest in approach B. The agency would be entitled to use a VSL of $7 million and to proceed on the ground that it has chosen the approach that maximizes net benefits. If it favors Approach A, it will likely face a number of questions about why it has done so.[54]

---

[52] For a decision invalidating a rule with what the court thought to be excessive cost-benefit ratios, see Corrosion Proof Fittings v. EPA, 947 F.2d 1201(5th Cir. 1991).

      Two agencies, EPA and DOT, have developed official guidance on VSL. On DOT, see note supra. EPA has changed its VSL to an older value of $6.3 million (2000 dollars) and adjusts this value for real income growth to later years. In its Regulatory Impact Analysis for a new primary standard for nitrogen dioxide, for example, EPA adjusted this VSL to account for a different currency year (2006) and for income growth to 2020, which yielded a VSL of $8.9 million. U.S. Envt'l Prot. Agency, Final Regulatory Impact Analysis (RIA) for the NO2 National Ambient Air Quality Standards (NAAQS) 4-8 n.11 (2010), *available at* http://www.epa.gov/ttn/ecas/regdata/RIAs/FinalNO2RIAfulldocument.pdf. Although the Department of Homeland Security has no official policy on VSL, it sponsored a report through its U.S. Customs and Border Protection and has used the recommendations of that report to inform VSL values for several rule makings. This report recommends $6.3 million (2008 dollars) and also recommends that DHS adjust this value upward over time for real income growth (in a manner similar to EPA's adjustment approach). Lisa A. Robinson, Valuing Mortality Risk Reductions in Homeland Security Regulatory Analyses, at vi (2008), *available at* http://www.regulatory-analysis.com/robinson-dhs-mortality-risk-2008.pdf.

      Other regulatory agencies that have used a VSL in individual rule makings include DOL's Occupational Safety and Health Administration and HHS's Food and Drug Administration. In OSHA's rule making setting a Permissible Exposure Limit for Hexavalent Chromium, it specifically referred to EPA guidance to justify a VSL of $6.8 million (2003 dollars), as the types of air exposure risks regulated in this rule making were similar to those in EPA rule makings. *See* 71 Fed. Reg. 10,100, 10,305 (Feb. 28, 2006) (to be codified at various parts of 29 C.F.R.). The FDA has consistently used values of $5 million and $6.5 million (2002 dollars) in several of its rule makings to monetize mortality risks. *See* 68 Fed. Reg. 41,434, 41,490 (July 11, 2003) (to be codified at 21 C.F.R. pt. 101); 68 Fed. Reg. 6062, 6076 (Feb. 6, 2003) (to be codified at 21 C.F.R. pt. 201). But it also uses a monetary value of the remaining life-years saved by alternative policies. This is sometimes referred to as a "Value of a Statistical Life Year" or VSLY. *See* Lisa A. Robinson, *How US Government Agencies Value Mortality Risk Reductions*, 1 Rev. Envt'l Econ. & Pol'y 283, 293 (2007).

[53] *See* Viscusi, *The Heterogeneity of the Value of A Statistical Life*, *supra* note (noting median value of $7 million to $8 million); Viscusi & Aldy, supra note.

[54] I am aware of no agency using a VSL as low as $4 million; agencies tend to be in the range of $6 million to $9 million. OFFICE OF MGMT. & BUDGET, DRAFT 2012 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS AND UNFUNDED MANDATES ON STATE, LOCAL, AND TRIBAL ENTITIES, *available at* http://www.whitehouse.gov/sites/default/files/omb/oira/draft_2012_cost_benefit_report.pdf

8. The annual cost of a potential regulation, offering a new approach to safety in some area, is $200 million. The regulation is expected to save 30 lives. The agency uses a VSL of $4 million, and for that reason, it is reluctant to proceed, and it submits a draft rule that explains why it is maintaining the status quo. In the interagency process, there will be considerable interest in going forward with the new approach, because (as noted) the technical literature supports a VSL of $7 million or higher.[55]

9. The annual costs of a regulation are $200 million. The agency uses a VSL of $8 million. The regulation is expected to prevent 24 premature deaths. The relevant deaths involve cancer. The agency argues that it should be able to use a "cancer premium,"[56] which would increase the VSL by 10 percent, thus ensuring that the benefits exceed the costs. This is an open question and a legitimate subject for discussion. The technical literature has not reached a final judgment on the question whether there should be a "cancer premium."[57] At the very least, it will be acceptable for the agency to do a sensitivity analysis in which it increases the VSL because cancer is involved.[58] It is possible that with reference to the sensitivity analysis, the agency will be able to conclude that the benefits "justify" the costs.

10. The annual costs of a regulation are $1 billion. The annual benefits are $650 million. The majority of those benefits come from preventing seventy deaths, with each statistical life being valued at $8 million. The

---

[55] *See id.*

[56] There is a large and growing literature on this question. *See* U.S. ENVTL. PROT. AGENCY, VALUING MORTALITY RISK REDUCTIONS FOR ENVIRONMENTAL POLICY: A WHITE PAPER (2010), *available at* http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0563-1.pdf/$file/EE-0563-1.pdf. *See also* Trudy Ann Cameron et al., Willingness to Pay for Health Reductions (June 2009) (unpublished manuscript), *available at* http://pages.uoregon.edu/cameron/vita/Cameron_DeShazo_Johnson_0619091.pdf; Cass R. Sunstein, *Bad Deaths*, 14 J. RISK & UNCERTAINTY 259 (1997).

Circular A-4 states: "The age of the affected population has also been identified as an important factor in the theoretical literature. However, the empirical evidence on age and VSL is mixed. In light of the continuing questions over the effect of age on VSL estimates, you should not use an age-adjustment factor in an analysis using VSL estimates." OMB CIRCULAR A-4, *supra* note. But it allows consideration of VSLY:

Another way that has been used to express reductions in fatality risks is to use the life expectancy method, the "value of statistical life-years (VSLY) extended." If a regulation protects individuals whose average remaining life expectancy is 40 years, a risk reduction of one fatality is expressed as "40 life-years extended." Those who favor this alternative approach emphasize that the value of a statistical life is not a single number relevant for all situations. In particular, when there are significant differences between the effect on life expectancy for the population affected by a particular health risk and the populations studied in the labor market studies, they prefer to adopt a VSLY approach to reflect those differences. You should consider providing estimates of both VSL and VSLY, while recognizing the developing state of knowledge in this area.

[57] See note supra.

[58] The EPA did such an analysis in the context of arsenic. *See* Cass R. Sunstein, *The Arithmetic of Arsenic*, 90 GEO. L.J. 2255 (2002).

agency notes that of the seventy deaths, forty involve children under the age of five. It contends for reasons of equity, and because many "life-years" are at stake, it is reasonable to proceed, notwithstanding the fact that the monetized benefits fall far short of the monetized costs.[59] This is a legitimate topic for discussion; the questions that it raises are open ones.[60] Drawing on contingent valuation studies, some research suggests that parents' VSL, for their children, is double their VSL for themselves.[61] Whether or not this research is sufficiently advanced or solid for government use, it provides an issue that is entitled to exploration in the OIRA process.

11. The annual costs of a regulation are $300 million. It would prevent 40 premature deaths annually. The agency uses a VSL of $8 million, and it concludes that the benefits justify the costs. The agency acknowledges that all of those deaths would involve elderly people – typically extending their lives by merely a few months. In the public comment process, some people object that it is not reasonable to use the standard VSL for very brief extensions of life. These objections will not go unnoticed in interagency discussions, but OMB guidance does not call for reducing the VSL in such cases.[62] The relevant question might well

---

[59] Consider here the Department of Transportation's proposed rule to increase rear visibility in motor vehicles, which grapples with issues of this kind. *See* 75 Fed. Reg. 76,186, 76,238 ("[T]he quantitative analysis does not offer a complete accounting. We have noted that well over 40 percent of the victims of backover crashes are very young children (under the age of five), with nearly their entire life ahead of them. Executive Order 12866 also refers explicitly to considerations of equity. (''(I)n choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including * * * equity), and there are strong reasons, grounded in those considerations, to prevent the deaths at issue here.")

[60] *See* Sean Williams, *Statistical Children*, YALE J. REG. (forthcoming 2013), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2176463.

[61] Id.

[62] *See* OMB CIRCULAR A-4, *supra* note: "The age of the affected population has also been identified as an important factor in the theoretical literature. However, the empirical evidence on age and VSL is mixed. In light of the continuing questions over the effect of age on VSL estimates, you should not use an age-adjustment factor in an analysis using VSL estimates. Another way that has been used to express reductions in fatality risks is to use the life expectancy method, the 'value of statistical life-years (VSLY) extended.' . . . Those who favor this alternative approach emphasize that the value of a statistical life is not a single number relevant for all situations. In particular, when there are significant differences between the effect on life expectancy for the population affected by a particular health risk and the populations studied in the labor market studies, they prefer to adopt a VSLY approach to reflect those differences. You should consider providing estimates of both VSL and VSLY, while recognizing the developing state of knowledge in this area. . . . In any event, when you present estimates based on the VSLY method, you should adopt a larger VSLY estimate for senior citizens because senior citizens face larger overall health risks from all causes and they may have accumulated savings to spend on their health and safety."

There were intense controversies over what was called the "senior death discount" in the Bush Administration. See Katharine Q. Seelye & John Tierney, *E.P.A. Drops Age-Based Cost Studies*, N.Y. TIMES (May 8, 2003), http://www.nytimes.com/2003/05/08/us/epa-drops-age-based-cost-studies.html. For discussion, see W. KIP VISCUSI & JOSEPH ALDY, LABOR MARKET ESTIMATES OF THE SENIOR DISCOUNT FOR THE VALUE OF A STATISTICAL LIFE (2006), *available at* http://www.rff.org/RFF/documents/RFF-DP-06-12.pdf; JOSEPH E. ALDY & W. KIP VISCUSI, AGE DIFFERENCES IN THE VALUE OF A STATISTICAL LIFE (2007), *available at* http://www.rff.org/documents/RFF-DP-07-05.pdf.

be discussed in the review process.

12.   The annual costs of a regulation are $250 million. It is anticipated to prevent thirty premature deaths each year. The agency uses a VSL of $7 million. The agency adds that the regulation will prevent a specified number of accidents or illnesses and also a specified amount of property damage, and the value of these benefits exceeds $75 million. If the numbers survive interagency scrutiny, and if there is no other problem (such as an alternative approach that would have higher net benefits), the regulation will go forward, because the benefits justify the costs.

IV. Wide Ranges

13.   The annual costs of a regulation are $200 million. Approach A has annual benefits of $400 million to $900 million, and Approach B has annual benefits of $500 million to $1 billion. There will be considerable discussion of what accounts for the width of the ranges, and of whether an understanding of the underlying materials suggests that the ranges can be narrowed. If, for example, the agency is using several scientific studies, the question will be whether one of them is better, and whether the better study can be used to narrow the range or to produce a point estimate.[63] And if the range is as wide as it is because the agency is using a VSL range of $1 million to $10 million[64] (and this would be highly surprising, so far as I know unprecedented), the interagency process will work toward using the technical literature to see if a single number can be used as the primary estimate. In principle, the estimates should be subject to probability weighting, to come up with some kind of expected value. A great deal of work would be done to try to achieve greater precision and confidence in the numbers. We would need to know much more about Approach A and Approach B to be confident, but it is not impossible that Approach B dominates Approach A along every dimension.

14.   The annual costs of a regulation are $200 million. The annual benefits range from $150 million to $400 million. Here as well, a great deal of work would be done to explore the benefits range. In principle, and as in (13), the estimates should be subject to probability weighting, to come up with some kind of expected value. Perhaps regulators can conclude that there is a 75 percent chance that the benefits are $150

---

[63] See note supra, showing a wide range with respect to estimates of the benefits of reducing particulate matter; the differences stem from different scientific studies, not from economics. See Fraas and Lutter, supra note. Different scientific assessments also played a role in the detailed discussion of different possible estimates in connection with the hours of service rule for truck drivers. See http://www.fmcsa.dot.gov/documents/hos/2011_HOS_Final_Rule_RIA.pdf

[64] This range is consistent with Circular A-4. As noted, however, the lower end of this scale does not fit with the technical literature, and hence serious questions would be raised by any effort to use that lower end.

million, a 10 percent chance that the benefits are $150 million to $200 million, a 10 percent chance that the benefits are $200 million to $300 million, and a 5 percent chance that the benefits are $200 million to $300 million. In practice, however, this kind of assignment is usually quite difficult. In the absence of full-scale probability weighting, many questions would be asked about whether the low ends of the range are the most highly probable, so that there is a realistic chance that the costs will exceed the benefits. Suppose – as is not unimaginable – that it is not possible to do more than to state the existence of a range. It would be tempting to consider using the midpoint[65] for purposes of analysis, if only for reasons of convenience, but this approach runs into obvious objections and concerns, because there is no reason, in the abstract, to think that the midpoint is correct.[66]

15. The annual costs of a regulation are $1.5 billion. The annual benefits range from $800 million to $2 billion. A great deal of work would be done to explore the benefits range, and in fact, the agency will be asked to do a formal uncertainty analysis, because the costs exceed $1 billion.[67] The various points within the range must, to the extent feasible, be subject to probability weighting, to come up with some kind of expected value. It is possible, of course, that existing information does not make such weighting feasible, but technical work is likely to be done to obtain a better understanding of the range.

16. The annual costs of a regulation are $200 million. Under Approach A, the annual benefits are between $100 million and $400 million. Under Approach B, the benefits are between $50 million and $700 million. This example is also exceedingly unusual; in fact I cannot recall any like it. As in previous scenarios, there would be a great deal of interest in understanding what accounts for these ranges and whether they might be narrowed. There would be interest in exploring the possibility that Approach B has a higher expected value and should therefore be chosen.[68]

17. The annual costs of a regulation are $200 million. The annual benefits range from $25 million to $225 million. It will be noticed that for most most of the range, the benefits are significantly lower than the cost. Reviewers will ask whether the agency can show that the higher ends of the range are more likely than the lower, or whether special

---

[65] *See, e.g.*, OFFICE OF MGMT. & BUDGET, 2011 REPORT TO CONGRESS, *supra* note, which uses the middle of the range for some accounting purposes.

[66] Perhaps one or another end of the scale can be shown to be more probable. The use of the middle of the range seems to suggest some kind of Principle of Equal Probability, and it is not clear if that principle can be defended, even under circumstances of uncertainty. See Sunstein, Worst-Case Scenarios, supra note, for citations and discussion.

[67] *See* OMB CIRCULAR A-4, *supra* note.

[68] *See* note *supra*.

circumstances are involved.

V. Cobenefits and Risk-Risk Tradeoffs

18.   A regulation designed to reduce mercury emissions would also serve to reduce emissions of other air pollutants, including particulate matter.[69] While the benefits of mercury reductions cannot be monetized (because of the limitations of the existing science), the benefits of reducing particulate matter can be, and they clearly exceed the costs of the regulation. The agency invokes the cobenefits as part of its assessment of costs and benefits, and as a central factor in its explanation of why the benefits justify the costs. Commenters on the proposed rule object that cobenefits should not be considered, because the rule is designed to reduce mercury emissions. Under OMB Circular A-4, the agency is entitled to consider the cobenefits.[70] What the agency is required to do is to offer a full accounting,[71] and cobenefits are part of that full accounting.

19.   A regulation designed to increase fuel economy also has effects on safety. The best analysis (we are speaking hypothetically[72]) suggests that those effects will be negative, in the sense that there will be a modest increase in deaths and accidents. The agency is required to discuss those negative effects and to include them in its full accounting.[73] Risk-risk analysis, including an assessment of the risks that would be introduced by efforts at risk reduction, is a standard part of cost-benefit analysis, and ancillary risks usually cannot be ignored.

---

[69] This example is realistic. See the EPA's analysis in connection with its mercury rule, 77 Fed. Reg. 9304 (Feb. 16, 2012), *available at* http://www.gpo.gov/fdsys/pkg/FR-2012-02-16/pdf/2012-806.pdf.

[70] *See* note *supra* (citing and quoting Regulatory Impact Analysis for mercury rule).

[71] Circular A-4 states: "Your analysis should look beyond the direct benefits and direct costs of your rulemaking and consider any important ancillary benefits and countervailing risks. An ancillary benefit is a favorable impact of the rule that is typically unrelated or secondary to the statutory purpose of the rulemaking (e.g., reduced refinery emissions due to more stringent fuel economy standards for light trucks) while a countervailing risk is an adverse economic, health, safety, or environmental consequence that occurs due to a rule and is not already accounted for in the direct cost of the rule (e.g., adverse safety impacts from more stringent fuel-economy standards for light trucks)." OMB CIRCULAR A-4, *supra* note. Of course the agency should avoid double-counting; the benefits must be genuinely attributable to the rule in question, and they must not be counted more than once in the analyses that accompany more than one rule. It would, for example, be a mistake to claim benefits from one rule when they are actually attributable to another, or to claim the same benefits twice. Because the benefits of particulate matter reductions are so large, see note supra, and because they play a role in many important regulations, both the scientific and the accounting questions continue to deserve careful attention.

[72] In its recent rule on fuel economy standards, the Department of Transportation did include additional costs from increased traffic congestion, vehicle accidents, and highway noise in its calculations. *See* 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62,624, 62,999 (Oct. 15, 2012) (to be codified at 49 C.F.R. pts. 523, 533, 536, 537).

[73] *See* the quotation from Circular A-4 in note *supra*.

20.   The principal benefits of an energy efficiency requirement (applicable to refrigerators) will come in the form of savings for consumers. The rule would also provide significant benefits in terms of air pollution reductions (including greenhouse gas reductions) and energy security. Nonetheless, the costs would greatly exceed the benefits if the agency did not include consumer savings. In the public comment period, some commentators contend that there is no market failure, that consumers should be able to make such choices as they like, and that the government cannot legitimately treat savings to consumers as "benefits."[74] The agency is entitled to reject this contention. Agencies have long counted such savings as benefits, and they are not prohibited from doing so.

At the same time, the agency will have to meet two challenges. *First*, it will have to identify the relevant market failure. It may well be able to rely on behavioral market failures associated with the Energy Paradox,[75] suggesting that with respect to energy efficiency, consumers do not always make decisions that serve their long-term interests.[76] Potential reasons include a lack of salience and myopia. In explaining the fuel economy rules issued in 2012, for example, the Department of Transportation referred to:

phenomena observed in the field of behavioral economics, including loss aversion, inadequate consumer attention to long-term savings, or a lack of salience of relevant benefits (such as fuel savings, or time savings associated with refueling) to consumers at the time they make purchasing decisions. Both theoretical and empirical research suggests that many consumers are unwilling to make energy-efficient investments even when those investments appear to pay off in the relatively short-term. This research is in line with related findings that consumers may undervalue benefits or costs that are less salient, or that they will realize only in the future.[77]

---

[74] Ted Gayer & W. Kip Viscusi, *Overriding Consumer Preferences with Energy Regulations* (Vanderbilt Law & Econ., Research Paper No. 12-24, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2111450.

[75] For a discussion of the energy paradox, see Adam B. Jaffe and Robert N. Stavins, *The Energy Paradox and the Diffusion of Conservation Technology*, 16 RESOURCE & ENERGY ECON. 91, 92–94 (1994).

[76] For a valuable overview, showing the complexity of the underlying issues and the amount that remains to be learned, see Hunt Alcott and Michael Greenstone, *Is There an Energy Efficiency Gap?*, 26 J. ECON. PERSP. 3 (2012). For an important discussion of externalities and internalities, see Hunt Allcott et al., *Energy Policy with Externalities and Internalities* (Nat'l Bureau of Econ. Research, Working Paper No. 17977, 2012), *available at* http://www.nber.org/papers/w17977. On behavioral market failures, see Cass R. Sunstein, *The Storrs Lectures: Behavioral Economics and Paternalism*, Yale LJ (forthcoming 2013).

[77] U.S. DEP'T OF TRANSP., NAT'L HIGHWAY TRAFFIC ADMIN., CORPORATE AVERAGE FUEL ECONOMY FOR MY 2017 – MY 2025, FINAL REGULATORY IMPACT ANALYSIS 983 (2012), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FRIA_2017-2025.pdf. It is true that the underlying questions deserve continuing investigation. For a valuable overview, showing the complexity of these questions and the amount that remains to be learned, see Hunt Allcott & Michael Greenstone, *Is There an*

Second, the agency will have to investigate whether energy efficiency requirements might result in less desirable refrigerators. If so, there will be a consumer welfare loss, and it must be treated as a cost, and possibly a high one. If, for example, refrigerators will cool less well, or if they will be less pleasing aesthetically, there will be an offsetting loss, potentially sufficiently high as to raise questions about the agency's basic analysis. The process of review will devote considerable attention to that possibility.

21. Same as (20), but the rule is designed to increase the fuel economy of vehicles. The agency invokes private fuel savings and time savings as benefits. It notes that consumers will save a great deal of money at the pump, and also that they will have to go to the gas station far less often, thus saving time (and it monetizes that benefit). The agency finds that because these (private) benefits are high, the costs of the proposed regulation are justified. But without these benefits, the regulation could not easily be justified in that way.

As in (20), commentators object that the private fuel savings should not be counted, and also that time savings should not be counted, because consumers are perfectly able to take account of those savings in deciding which vehicles to buy.[78] The agency is entitled to reject the objection. Again as in (20), it should identify the market failure[79] and explore the possibility of consumer welfare losses, which would unquestionably count as costs.[80]

Energy Efficiency Gap?, 26 J. ECON. PERSP. 3 (2012). For an important discussion of externalities and internalities, see Hunt Alcott et al., *supra* note.

[78] *See* Gayer & Viscusi, *supra* note.

[79] In a relevant rule, the EPA stated as follows:

The central conundrum has been referred to as the Energy Paradox in this setting (and in several others). In short, the problem is that consumers appear not to purchase products that are in their economic self-interest. There are strong theoretical reasons why this might be so:

-- Consumers might be myopic and hence undervalue the long-term.

-- Consumers might lack information or a full appreciation of information even when it is presented.

-- Consumers might be especially averse to the short-term losses associated with the higher prices of energy efficient products relative to the uncertain future fuel savings, even if the expected present value of those fuel savings exceeds the cost (the behavioral phenomenon of "loss aversion").

-- Even if consumers have relevant knowledge, the benefits of energy-efficient vehicles might not be sufficiently salient to them at the time of purchase, and the lack of salience might lead consumers to neglect an attribute that it would be in their economic interest to consider.

Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324, 25,510–511 (May 7, 2010) (to be codified at 49 C.F.R. pts. 531, 533, 536, 537 and 538).

[80] In particular, DOT did a sensitivity analysis with consumer welfare losses, finding that even if such losses are very high, the benefits of its fuel economy rules justify the costs. *See* U.S. DEP'T OF TRANSP., NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FINAL REGULATORY IMPACT ANALYSIS: CORPORATE AVERAGE FUEL ECONOMY FOR MY 2012–MY 2016 PASSENGER CARS AND LIGHT TRUCKS 419–433, 432 tbl.VIII-18

VI. Benefits, Hard or Impossible to Quantify

22.   The annual costs of a regulation are $200 million. The regulation would increase water quality, but it would have no beneficial effects on human health, and the agency is unable to use market measures to quantify and monetize other benefits (for example, aesthetic or recreational benefits). The agency relies on contingent valuation studies (sometimes called "stated preference" studies), which suggest that people would be willing to pay a significant amount to improve water quality in the relevant respects. Reliance on such studies is not forbidden by OMB Circular A-4.[81] The interagency process will devote careful scrutiny to the relevant studies, to ensure that they are credible and meet appropriate standards; but they are not out of bounds.[82]

23.   The annual costs of a regulation are $200 million. The monetized annual benefits are $175 million. The regulation is designed to promote building access for people in wheelchairs, and the agency believes that the $25 million shortfall is not fatal, because nonquantifiable values are involved. Those values may well be sufficient to justify the regulation.

    This example is not entirely hypothetical. As part of a regulation increasing building access for disabled people, the Department of Justice included a provision designed to protect wheelchair users by requiring new bathrooms to contain sufficient space for them. The cost of this provision was relatively high.[83] The Department acknowledged that "the monetized costs of these requirements substantially exceed the monetized benefits."[84] The Department's response to this concern is worth quoting at length[85]:

        [T]he additional benefits that persons with disabilities will

---

(2010), *available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/CAFE_2012-2016_FRIA_04012010.pdf.

[81] OMB CIRCULAR A-4, *supra* note: "To the extent possible, agencies should estimate people's valuations of benefits and costs using revealed preference studies based on actual behavior. . . . If the goods or attributes of goods that are affected by regulation — such as preserving environmental or cultural amenities — are not traded in markets, it may be difficult to use revealed preference methods. . . . In the absence of an organized market, it is difficult to estimate use and non-use values. When studies are designed to elicit such values either though indirect market studies or stated preference methods, agencies should pay careful attention to characterization of the uncertainties. However, overlooking or ignoring these values may significantly understate the benefits and/or costs of regulatory action."

[82] For recent discussion, see Jerry Housman, *From Dubious to Hopeless*, 26 J. ECON. PERSP. 43 (2012); Richard Carson, *Contingent Valuation: A Practical Alternative Where Prices Aren't Available*, 26 J. ECON. PERSP. 27 (2012).

[83] Nondiscrimination on the Basis of Disability in State and Local Government Services, 75 Fed. Reg. 56,163, 56,170 (Sept. 15, 2010) (to be codified at 28 C.F.R. pts. 35, 36)

[84] *Id.*

[85] *Id.*

derive from greater safety, enhanced independence, and the avoidance of stigma and humiliation--benefits that the Department's economic model could not put in monetary terms--are, in the Department's experience and considered judgment, likely to be quite high. Wheelchair users, including veterans returning from our Nation's wars with disabilities, are taught to transfer onto toilets from the side. Side transfers are the safest, most efficient, and most independence-promoting way for wheelchair users to get onto the toilet. The opportunity to effect a side transfer will often obviate the need for a wheelchair user or individual with another type of mobility impairment to obtain the assistance of another person to engage in what is, for most people, among the most private of activities. . . . [I]t is important to recognize that the ADA is intended to provide important benefits that are distributional and equitable in character. These water closet clearance provisions will have non-monetized benefits that promote equal access and equal opportunity for individuals with disabilities.

24.   Same as (23), but the cost of the regulation is $1 billion, not $200 million, and so the shortfall is $825 million. The question is whether that shortfall, which is (obviously) significant, can be justified by reference to nonquantifiable values. Authoritative documents do not give specific answers. To resolve the question, many agencies have found it useful to engage in what is called *breakeven analysis*.[86] Under this approach, agencies specify how high the unquantified or unmonetized benefits would have to be in order for the benefits to justify the costs.[87] The question would therefore be: Are the dignitary and related benefits of the rule worth an expenditure of $825 million[88]?

---

[86] For discussion, see OFFICE OF MGMT. & BUDGET, 2011 ANNUAL REPORT TO CONGRESS, *supra* note.
[87] For details, see Sunstein, Nonquantifiable, supra note.
[88] Note that in a rule involving building access for people in wheelchairs, the Department of Justice spoke explicitly of breakeven analysis, in a passage that is worth quoting at length:

      The requirements relating the water closet clearances are among the most costly (in monetary terms) of the new provisions. Although the *monetized* costs of these requirements substantially exceed the *monetized* benefits, the benefits that have not been monetized (avoiding stigma and humiliation, protecting safety, and enhancing independence) are expected to be quite high. . . .
      We estimate that the costs of the requirement as applied to out-swinging doors will exceed the monetized benefits by $454 million, which when annualized over 54 years equals a net cost of approximately $32.6 million a year.
      We estimate that people with the relevant disabilities will use a newly accessible single-user toilet room with an out-swinging door approximately 677 million times per year. Dividing the $32.6 million annual cost by the 677 million annual uses, we conclude that for the costs and benefits to break even in this context, people with the relevant disabilities will have to value safety, independence, and the avoidance of stigma and humiliation at just under 5 cents per use.
      There are substantially fewer single-user toilet rooms with in-swinging doors, and substantially fewer people with disabilities will benefit from making those rooms accessible. And the alterations costs to make a single-user toilet room with an in-swinging door accessible are substantially higher (because of the space taken up by the door) than the equivalent costs of

The *total* annual cost of economically significant regulations often ranges between $5 billion and $10 billion, and an expenditure of $1 billion, not supported by monetizable benefits that come anywhere close to that figure, would face a heavy burden of justification.

We could imagine some polar cases. Suppose that the regulation would benefit relatively few people – that the number of disabled people who would have access to bathrooms, as a result of the regulation, would be around 200 per year. If so, the question would be whether it would be worthwhile to spend over $46 million annually for each. Recall that some studies suggest that the value of a statistical life ranges around $7-$8 million; in that light, a $46 million annual expenditure would seem difficult to defend. By contrast, suppose that the regulation would benefit many people, say 10,000 annually. In that event, the per-person cost would be $92,500. That is still a substantial amount, and some people might think it too high to provide adequate justification, but it would warrant a discussion.

25.   Same as (24), but we are dealing with a regulation designed to protect clean water, not disabled people. Suppose that the agency does not rely on contingent valuation studies but suggests that the nonquantifiable benefits are substantial and justify the costs. Relevant questions would be: How many water bodies? What kinds of improvements? What would those improvements actually achieve? Would they help human beings, and if so how? An expenditure of $1 billion would not be easy to defend, assuming that the quantifiable benefits are in the range of $175 million, and unless the law required the agency to proceed, the rule would encounter serious questions.

Suppose, however, that once we investigate the details, we find that the

---

making a room with an out-swinging door accessible. Thus, we calculate that the costs of applying the toilet room accessibility standard to rooms with in-swinging doors will exceed the monetized benefits of doing so by $266.3 million over the life of the regulation, or approximately $19.14 million per year when annualized over 54 years.

      We estimate that people with the relevant disabilities will use a newly accessible single-user toilet room with an in-swinging door approximately 8.7 million times per year. Dividing the $19.14 million annual cost by the 8.7 million annual uses, *we conclude that for the costs and benefits to break even in this context, people with the relevant disabilities will have to value safety, independence, and the avoidance of stigma and humiliation at approximately $2.20 per use.*

      DEPARTMENT OF JUSTICE: DISABILITY RIGHTS SECTION OF THE CIVIL RIGHTS DIVISION, FINAL REGULATORY IMPACT ANALYSIS OF THE FINAL REVISED REGULATIONS IMPLEMENTING TITLES II AND III OF THE ADA, INCLUDING REVISED ADA STANDARDS FOR ACCESSIBLE DESIGN 142-143, available at http://www.ada.gov/regs2010/RIA_2010regs/DOJ%20ADA%20Final%20RIA.pdf (emphasis added). Relevant additional discussion, including estimates of the value people with disabilities place on avoiding stigma (based on revealed-preference studies), can also be found in the Regulatory Impact Analysis.

rule would achieve a great deal – for example, because it would protect a very large number of water bodies, and do a great deal for them, with a wide range of aesthetic and ecological benefits (including the protection of fish and wildlife). Once these questions are explored, we may have enough to justify a serious discussion. If, by contrast, the number of water bodies is relatively small, and the benefits for them would not be great, a significant expenditure would not be easy to justify.[89]

26.   The annual cost of a regulation would be $100 million. It would have no easily monetized benefits. Its principal benefits would accrue to animals, in the form of longer and healthier lives (and let us stipulate far less suffering as well). One possibility would be to use stated preference studies to obtain monetary equivalents, though it might be challenging to make such studies credible and reliable.[90] Another possibility would be to engage in breakeven analysis here as well. As before, a degree of quantification may be helpful short of monetization. Would there be benefits for human beings? Of what kind? How many animals would be helped? A very large number? How much would they be helped? A great deal? Answers to those questions might well prove to be clarifying.

27.   A regulation is designed to reduce the risk of a financial crisis by stabilizing the financial system. Its annual costs are projected to be $400 million. The agency states that the regulation will make a crisis less likely, but it cannot quantify the extent of the effect. In its Regulatory Impact Analysis, the agency describes the cost of a crisis, if it should occur, and states that if the rule reduces the risk even by a very small percentage (which is specified), its benefits will justify its costs. These claims will receive considerable scrutiny in the review process. Under the circumstances, a form of breakeven analysis may be the best that can be done.[91]

---

[89] Note that a framing effect might seem relevant here – and lead in unfortunate directions. Suppose, for example, that a rule has a cost of $100 million and that it would provide water quality benefits. The benefits would need specification, but suppose it were asked: Should each citizen of the United States be willing to spend just 33 cents annually to improve water quality? Or one cent per month? Or 1/30 of a cent per day? Questions of this sort might seem to make seemingly high costs seem quite low. Suppose that a rule would cost $1 billion and save 100 lives per year. On standard cost-benefit grounds, the rule would not be so easy to defend. But suppose it were asked: Would each American be willing to spend to spend $3 annually to save just $100 lives?

     The problem with these narrow frames is that they mask the economic effect of costly rules, and make it difficult or impossible to estabalish priorities and make sensible comparisons and tradeoffs. It might as well be asked: Would Americans be willing to spend $1 billon per year to save 1/3 of a life per day? If we look monthly or daily expenditures (why not hourly?), we will quickly turn high costs into small ones and thus mask their aggregate effects.

[90] See note supra.

[91] OIRA does not review rules from independent regulatory commissions, and hence reviews rules of this kind only if the Department of Treasury is involved.

28.   The annual cost of a regulation is $200 million. The annual benefits are $180 million. The benefits would be enjoyed by low-income workers, who would be protected from serious safety risks. The costs would be imposed on companies that produce a good enjoyed mostly by wealthy people; let us stipulate tat the costs would fall on consumers. The agency contends that while the benefits do not "exceed" the costs, the distributional impact matters, and supports its conclusion that the benefits "justify" the costs. In principle, this argument is fully available under Executive Order 13563, which explicitly refers to "distributive impacts."[92]

VII. Net Benefits

29.   The costs of a regulation, under Approach A, are $250 million. The benefits range from $350 million to $400 million. Under approach B, the costs of the regulation are $1 million, and the benefits are $250 million. The strong presumption would be in favor of approach B. Although the benefits are significantly smaller, the net benefits are higher. Net benefits are what matter.[93]

30.   The costs of a regulation, under Approach A, are $1 billion. The benefits are $200 million. Under Approach B, the costs are $20 million, but the benefits are merely $1 million. Approach A has a cost-benefit ratio of 5 to 1, whereas Approach B has a cost-benefit ratio of 20-1. While Approach B seems unlikely to meet the requirements of the applicable Executive Orders, because its costs exceed its benefits, it is far preferable to Approach A, because (and this is a fundamental point) *what matters is the net benefits figure, not the cost-benefit ratio*.[94] To see the point, consider a rule with costs of $1 and benefits of $10, and compare that rule with one having costs of $300,000 and benefits of $400,000. The first has a benefit-cost ratio of 10 to 1, and the second has a far inferior 4 to 3 ratio – but net benefits of $100,000 are far better than net benefits of $9, and net benefits are what matter.

VIII. Climate Change

---

[92] *See* Executive Order 13563, section 1, 76 Fed. Reg. 3821 (Jan. 18, 2011). *See also* John D. Graham, *Saving Lives Through Administrative Law and Economics*, 157 U. PA. L. REV. 395 (2008).

[93] Note that in the context of de-icing airplanes, the Environmental Protection Agency finalized an approach with far lower costs, and also lower benefits, than the approach that it proposed. Effluent Limitations Guidelines and New Source Performance Standards for the Airport Deicing Category, 77 Fed. Reg. 29,168 (to be codified at 40 C.F.R. pts. 9, 449), *available at* http://www.gpo.gov/fdsys/pkg/FR-2012-05-16/pdf/2012-10633.pdf.

[94] See OMB Circular A-4: "The size of net benefits, the absolute difference between the projected benefits and costs, indicates whether one policy is more efficient than another. The ratio of benefits to costs is not a meaningful indicator of net benefits and should not be used for that purpose. It is well known that considering such ratios alone can yield misleading results."

31.   The annual costs of a regulation are $200 million. As a result of air
        pollution reductions, the regulation will produce monetized health
        benefits of $50 million. It will also eliminate ten million tons of carbon
        dioxide emissions. The central value for the social cost of carbon is
        $22,[95] and hence the ten million ton reduction is valued at $220 million.
        The benefits of the regulation appear to justify the costs. If the numbers
        are reliable, and unless there is a problem of one or another kind,[96] it can
        go forward.

32.   The annual costs of a regulation are $200 million. The regulation will
        produce annual health benefits, as a result of air pollution reductions, of
        $30 million. It will also eliminate five million tons of carbon dioxide
        emissions annually. The central value for the social cost of carbon is
        $22, and hence the ten million ton reduction is valued at $110 million.
        In light of standard requirements, the benefits of the regulation do not
        appear to justify the costs, and serious questions will be raised in the
        process of interagency review.

        Invoking the latest work by economists and scientists, however, the
        agency contends that the social cost of carbon figure is too low and that
        it should be at least $40 per ton, in which case the benefits would justify
        the costs. This argument would be unsuccessful. The social cost of
        carbon was a product of an interagency process, and it reflects the
        official position of the U.S. government. Until it is changed through an
        appropriate process, it is binding.

33.   Same as (32), except that the agency notes that the social cost of carbon
        is a range, not a point estimate, and that at the higher end of the range,
        the relevant figures are $42 and $66, and that with these values, the
        benefits justify the costs. The agency contends that the central value
        should not be decisive and that it should be able to exercise its
        discretion so as to proceed. This contention would be an appropriate
        matter for discussion.

IX. Discount Rates

34.   Same as (32), but the agency notes that many people believe that a low
        discount rate is justified for the climate change problem, and that with
        an appropriately low rate – say, 2 percent – the regulation is justified.
        This argument would be unsuccessful. The official discussion of the
        social cost of carbon includes a discussion of the discount rate problem
        and settles on a particular approach.[97] It was a product of an interagency

---

[95] *See* note *supra*.
[96] *See* note *supra*.
[97] *See* note *supra*.

process, and it reflects the position of the U.S. government. Until it is changed through an appropriate process, it is binding.

35.   The cost of a regulation is $200 million. At a 7 percent discount rate, the benefits are $120 million. At a 3 percent discount rate, the benefits are $170 million. At a 2 percent discount rate, the benefits are $205 million. The agency contends that the appropriate discount rate is 2 percent. There are no issues of intergenerational equity; the principal benefits will occur in the next fifteen years. The regulation will run into serious questions. OMB Circular A-4 calls for discount rates of 7 percent and 3 percent, and it does not allow agencies to depart from those figures (with a qualification for very long time horizons[98]). Until OMB Circular A-4 is changed, it is binding, because it reflects the official position of the U.S. government.

36.   The cost of a regulation is $200 million. At a 7 percent discount rate, the benefits are $150 million. At a 3 percent discount rate, the benefits are $210 million. The agency proposes to use a 3 percent discount rate. It is possible that the agency may proceed. Circular A-4 offers guidance[99]:

> As a default position, OMB Circular A-94 states that a real discount rate of 7 percent should be used as a base-case for regulatory analysis. The 7 percent rate is an estimate of the average before-tax rate of return to private capital in the U.S. economy. . . . It approximates the opportunity cost of capital, and it is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector. . . . The effects of regulation do not always fall exclusively or primarily on the allocation of capital. When regulation primarily and directly affects private consumption (e.g., through higher consumer prices for goods and services), a lower discount rate is appropriate. The alternative most often used is sometimes called the "social rate of time preference." . . . If we take the rate that the average saver uses to discount future consumption as our measure of the social rate of time preference, then the real rate of return on long-term government debt may provide a fair approximation. Over the last thirty years, this rate has averaged around 3 percent in real terms on a pre-tax basis.

> It follows that the choice between 7 percent and 3 percent depends on

---

[98] *See* Richard G. Newell & William A. Pizer, *Discounting the Distant Future*, 46 J. ENVTL. ECON. & MGMT. 52 (2003).

[99] *See* OMB CIRCULAR A-4, *supra* note ("If your rule will have important intergenerational benefits or costs you might consider a further sensitivity analysis using a lower but positive discount rate in addition to calculating net benefits using discount rates of 3 and 7 percent.")

whether the costs of regulation fall on the allocation of capital or on private consumption. In practice, agencies have often used both measures, and as a general rule, the choice between 7 percent and 3 percent has not mattered to the ultimate decision about whether and how to proceed.

Conclusion

My goal here has been to explore how certain highly stylized problems are likely to be handled, in an effort to cast light on the real world of cost-benefit analysis. Inside the government, the central decisions are made by reference to authoritative documents and to standard operating procedures under the shadow of those documents – a kind of common law for cost-benefit analysis.

Needless to say, objections might be mounted against some existing practices. The area of climate change raises especially vexing questions, and some people have questioned the analysis that underlies the current social cost of carbon.[100] One of my central points here is an institutional one. Substantive judgments are embodied in binding documents and settled practices. If they are to be changed, it is typically a result of an extended process, which will involve many officials and sometimes a public comment period, and which is likely to bear fruit only if and when a consensus emerges.

To be sure, this constraint can cause real problems, because it might ensure that decisions that are imperfect, or worse, remain entrenched for significant periods. A form of status quo bias – well-known within behavioral economics[101] -- is unquestionably part and parcel of government practice. But the constraint is also an important safeguard. By ensuring both internal and external scrutiny of new initiatives, it increases the likelihood that they will become binding only if their foundations are genuinely secure.

---

[100] *See, e.g.*, Nordhaus, *supra* note; Weitzmann, *supra* note; Masur & Posner, *supra* note.
[101] William Samuelson and Richard Zeckhauser, Status Quo Bias in Decision Making, 1 J Risk and Uncertainty 7 (1988).

Appendix A

The Social Cost of Carbon

Annual SCC Values: 2010–2050 (in 2007 dollars)[102]

Discount Rate Year	5% Avg	3% Avg	2.5% Avg	3% 95th
2010	4.7	21.4	35.1	64.9
2011	4.9	21.9	35.7	66.5
2012	5.1	22.4	36.4	68.1
2013	5.3	22.8	37.0	69.6
2014	5.5	23.3	37.7	71.2
2015	5.7	23.8	38.4	72.8
2016	5.9	24.3	39.0	74.4
2017	6.1	24.8	39.7	76.0
2018	6.3	25.3	40.4	77.5
2019	6.5	25.8	41.0	79.1
2020	6.8	26.3	41.7	80.7
2021	7.1	27.0	42.5	82.6
2022	7.4	27.6	43.4	84.6
2023	7.7	28.3	44.2	86.5
2024	7.9	28.9	45.0	88.4
2025	8.2	29.6	45.9	90.4
2026	8.5	30.2	46.7	92.3
2027	8.8	30.9	47.5	94.2
2028	9.1	31.5	48.4	96.2
2029	9.4	32.1	49.2	98.1
2030	9.7	32.8	50.0	100.0
2031	10.0	33.4	50.9	102.0
2032	10.3	34.1	51.7	103.9
2033	10.6	34.7	52.5	105.8
2034	10.9	35.4	53.4	107.8
2035	11.2	36.0	54.2	109.7
2036	11.5	36.7	55.0	111.6
2037	11.8	37.3	55.9	113.6
2038	12.1	37.9	56.7	115.5
2039	12.4	38.6	57.5	117.4
2040	12.7	39.2	58.4	119.3
2041	13.0	39.8	59.0	121.0
2042	13.3	40.4	59.7	122.7

---

[102] INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, U.S. GOVT., TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS 39 tbl.A1 (2010), *available at* http://www.epa.gov/oms/climate/regulations/scc-tsd.pdf

2043	13.6	40.9	60.4	124.4
2044	13.9	41.5	61.0	126.1
2045	14.2	42.1	61.7	127.8
2046	14.5	42.6	62.4	129.4
2047	14.8	43.2	63.0	131.1
2048	15.1	43.8	63.7	132.8
2049	15.4	44.4	64.4	134.5
2050	15.7	44.9	65.0	136.2

Appendix B

Estimated Benefits and Costs of Recent Major Rules

**Major Rules Reviewed with Estimates of Both Annual Benefits and Costs,
October 1, 2010 – September 30, 2011 (billions of 2001 dollars)[103]**

Agency	RIN	Title	Benefits	Costs
HHS	0910-AG41	Cigarette Warning Label Statements	0.2 Range: 0–9.0	<0.1
HHS	0938-AQ12	Administrative Simplification: Adoption of Authoring Organizations for Operating Rules and Adoption of Operating Rules for Eligibility and Claims Status (CMS-0032- IFC)	1.0 Range: 0.9–1.1	0.4 Range: 0.3–0.6
DOL	1210-AB07	Improved Fee Disclosure for Pension Plan Participants	1.6 Range: 0.8–3.3	0.3 Range: 0.2–0.4
DOL	1210-AB35	Statutory Exemption for Provision of Investment Advice	10.9 Range: 5.8–15.1	3.0 Range: 1.6–4.2
DOE	1904-AA89	Energy Efficiency Standards for Clothes Dryers and Room Air Conditioners	0.2 Range: 0.2–0.3	0.1 Range: 0.1–0.2
DOE	1904-AB79	Energy Efficiency Standards for Residential Refrigerators, Refrigerator-Freezers, and Freezers	1.8 Range: 1.7–3.0	0.8 Range: 0.8–1.3
DOE	1904-AC06	Energy Efficiency Standards for Residential Furnaces, Central Air Conditioners and Heat Pumps	0.9 Range: 0.7–1.8	0.5 Range: 0.5–0.7
EPA	2040-AF11	Water Quality Standards (Numeric Nutrient Criteria) for Florida's Lakes and Flowing Waters	<0.1	0.1 Range: 0.1–0.2
EPA	2050-AG50	Oil Pollution Prevention: Spill Prevention, Control, and Countermeasure Rule Requirements - Amendments for Milk Containers	0	(0.1)
EPA	2060-AP50	Cross State Air Pollution Rule (CAIR Replacement Rule)	Range: 20.5–59.7	0.7
DOT	2125-AF19	Real-Time System Management Information Program	0.2	0.1
DOT	2127-AK23	Ejection Mitigation	1.5 Range: 1.5–2.4	0.4 Range: 0.4–1.4
DOT & EPA	2127-AK74;	Commercial Medium- and Heavy-Duty On- Highway Vehicles and Work Truck	2.6 Range: 2.2–2.6	0.5 Range: 0.3–0.5

[103] OFFICE OF MGMT. & BUDGET, DRAFT 2012 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS 23 tbl.1-5(a) (2012), *available at* http://www.whitehouse.gov/sites/default/files/omb/oira/draft_2012_cost_benefit_report.pdf. Note that the two footnotes in this Appendix are taken directly from the relevant reports.

	2060-AP61	Fuel Efficiency Standards		

( ) indicates negative.

**Major Rules Reviewed with Estimates of Both Annual Benefits and Costs,
October 1, 2009 – September 30, 2010 (billions of 2001 dollars)[104]**

Agency	RIN	Title	Benefits	Costs
DOJ	1117-AA61	Electronic Prescriptions for Controlled Substances	0.3–1.3	<0.1
DOJ	1190-AA44	Nondiscrimination on the Basis of Disability in Public Accommodations and Commercial Facilities	1.1 Range: 1.0–2.1	0.6 Range: 0.5–0.7
DOJ	1190-AA46	Nondiscrimination on the Basis of Disability in State and Local Government Services	Range: 0.2–0.3	Range: 0.1–0.2
DOL	1218-AC01	Cranes and Derricks in Construction	0.2	0.1
DOE	1904-AA90	Energy Efficiency Standards for Pool Heaters and Direct Heating Equipment and Water Heaters	1.4 Range: 1.3–1.8	Range: 1.0–1.1
DOE	1904-AB70	Energy Conservation Standards for Small Electric Motors	Range: 0.7–0.8	0.2
DOE	1904-AB93	Energy Efficiency Standards for Commercial Clothes Washers	Range: 0–0.1	<0.1
EPA	2050-AG16	Revisions to the Spill Prevention, Control, and Countermeasure (SPCC) Rule	0	(0.1)
EPA	2060-AO15	NESHAP: Portland Cement Notice of Reconsideration	Range: 6.1–16.3	Range: 0.8–0.9
EPA	2060-AO48	Review of the National Ambient Air Quality Standards for Sulfur Dioxide[105]	10.5 Range: 2.8–38.6	0.7 Range: 0.3–2.0
EPA	2060-AP36	National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (Diesel)	Range: 0.7–1.9	0.3
EPA	2060-AQ13	National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines--Existing Stationary Spark Ignition (Gas-Fired)	Range: 0.4–1.0	0.2
EPA	2070-AJ55	Lead; Amendment to the Opt-out and Recordkeeping Provisions in the	Range: 0.8–3.0	0.3

---

[104] OFFICE OF MGMT. & BUDGET, 2011 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS 25 tbl.1-5(a) (2011), *available at* http://www.whitehouse.gov/sites/default/files/omb/inforeg/2011_cb/2011_cba_report.pdf.
[105] The agency provided benefit and cost estimates for 2020. In order to annualize, as with previous NAAQS rulemakings, OMB assumed that the benefits and costs would be zero in the first year after the rule is finalized, the benefits and costs would increase linearly until year 2020, and the benefit and cost estimates would equal the 2020 estimates thereafter. [This note is taken directly from 2011 REPORT TO CONGRESS, supra note.]

		Renovation, Repair, and Painting Program		
DOT	2120-AI92	Automatic Dependent Surveillance--Broadcast (ADS-B) Equipage Mandate to Support Air Traffic Control Service	Range: 0.1–0.2	0.2
DOT	2126-AA89	Electronic On-Board Recorders for Hours-of- Service Compliance	0.2	0.1
DOT	2130-AC03	Positive Train Control	<0.1	0.7 Range: 0.5–1.3
DOT	2137-AE15	Pipeline Safety: Distribution Integrity Management	0.1	0.1
DOT & EPA	2127-AK50; 2060-AP-58	Light-Duty Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards[106]	11.9 Range: 3.9–18.2	3.3 Range: 1.7–4.7

( ) indicates negative.

--

**Estimates of the Total Annual Benefits and Costs of Major Rules Reviewed
October 1, 2008 – September 30, 2009 (millions of 2001 dollars)[107]**

Agency	Title	Benefits	Cost
DOE/ EE	Energy Efficiency Standards for Commercial Refrigeration Equipment	196 Range: 186–224	81 Range: 69–81
DOE/ EE	Energy Efficiency Standards for General Service Fluorescent Lamps and Incandescent Lamps	1,924 Range: 1,111–2,886	486 Range: 192–657
HHS/ AHRQ	Patient Safety and Quality Improvement Act of 2005 Rules	93 Range: 69–136	97 Range: 87–121
HHS/ CMS	Revisions of HIPAA Code Sets	209 Range: 77–261	217 Range: 44–238
HHS/ CMS	Updates to Electronic Transactions (Version 5010)	1,988 Range: 1,114–3,194	1,090 Range: 661–1,449
HHS/ FDA	Prevention of Salmonella Enteritidis in Shell Eggs	1,284 Range: 206–8,583	74 Range: 48–106

---

[106] DOT and EPA estimates differ somewhat due to programmatic differences between the two rules and differences in estimation modeling. The range of cost and benefit are based the total cost and benefits estimates for model years 2012-2016 in DOT's RIA, annualized over the life of those vehicles. The primary estimates are based on the total cost and benefits estimates for model years 2012-2016 in EPA's RIA annualized at 7% over the life of those vehicles. [This note is taken directly from 2011 REPORT TO CONGRESS, supra note.]

[107] OFFICE OF MGMT. & BUDGET, 2010 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS 22 tbl.1-4 (2010), *available at*
http://www.whitehouse.gov/sites/default/files/omb/inforeg/2011_cb/2011_cba_report.pdf

HUD/ OH	Real Estate Settlement Procedures Act (RESPA); To Simplify and Improve the Process of Obtaining Mortgages and Reduce Consumer Costs (FR-5180)	2,303	884
DOT/ FAA	Part 121 Pilot Age Limit	35 Range: 30–35	4
DOT/ FAA	Washington, DC, Metropolitan Area Special Flight Rules	239 Range: 10–839	92 Range: 89–382
DOT/ FMCSA	Hours of Service of Drivers	0–1,760	0–105
DOT/ FMCSA	New Entrant Safety Assurance Process	472–602	60–72
DOT/ NHTSA	Passenger Car and Light Truck Corporate Average Fuel Economy Model Year 2011	1,665 Range: 857– 1,905	979 Range: 650– 1,910
DOT/ NHTSA	Reduced Stopping Distance Requirements for Truck Tractors	1,250 Range: 1,250– 1,520	46 Range: 23–164
DOT/ NHTSA	Roof Crush Resistance	652 Range: 374– 1,160	896 Range: 748– 1,189
DOT/ PHMSA	Piline Safety: Standards for Increasing the Maximum Allowable Operating Pressure for Gas Transmission Pipelines	85 Range: 85–89	13 Range: 13–14
EPA/AR	Review of the National Ambient Air Quality Standards for Lead	455–5,203	113–2,241