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The Arithmetic of Climate Change

Cass R. Sunstein*

Abstract

In its ideal form, arbitrariness review is an instrument for promoting “deliberative democracy” – a system that combines reason-giving with political accountability. Under arbitrariness review in its current form, courts tend to embrace the “hard look doctrine,” which has a procedural component, requiring agencies to offer detailed justifications, and also a substantive component, in which courts assess the reasonableness of the agencies’ choices on the merits. These are serious constraints on the executive branch, and they also reduce the risk of large-scale instability in government, in which scientific and economic judgments are overridden by political considerations. With respect to regulatory policy, it is not enough to say that “elections have consequences.”

For climate change in particular, the “social cost of carbon,” or more broadly the “social cost of greenhouse gases,” is sometimes described as “the most important number you’ve never heard of.” A key reason is that within the executive branch, the stringency of regulation of greenhouse gases emissions often depends on that number. Another reason is that the social cost of carbon can and should play a role in determining the content of other kinds of initiatives, such as a carbon tax. In the United States, the relevant numbers were challenged in court under the administrations of Barack Obama (where they were upheld) and Donald Trump (where they were struck down). The litigation raises fundamental questions about the role of science, economics, and politics in judicial review of agency action, and about the relationship between courts and the administrative state.

With respect to the social cost of carbon: (1) A decision to use the global number, as opposed to the domestic number, would be straightforward to defend against an arbitrariness challenge; a decision to use the domestic number, as opposed to the global number, would be difficult to defend against an arbitrariness challenge. (2) A decision to use a low discount rate, such as two percent, would be straightforward to defend against an arbitrariness challenge; a decision to use a high discount rate, such as seven percent, would be exceedingly difficult to defend against an arbitrariness challenge. (3) A wide range of decisions – involving, for example, climate sensitivity and the damage function -- raise difficult questions in science and economics; they should be straightforward to defend

* Robert Walmsley University Professor, Harvard University. I am grateful to Benjamin Eidelson, Eric Posner, and Lucia Reisch for valuable comments on a previous draft; I am also grateful to Matthew Adler and Michael Greenstone for illuminating discussions. The current draft of this Article was started in 2017 but completed in 2021, when the author served as Senior Counselor and Regulatory Policy Officer at the Department of Homeland Security; nothing here represents, is connected to, or bears on an official view in any way.

against an arbitrariness challenge, but only if they follow from a reasoned justification. (4) Approaches that take account of equity – including “prioritarianism” – should be defensible against an arbitrariness challenge, as should be a refusal to adopt such approaches, but here again, a reasoned justification is required. (5) A decision to “back out” a social cost of carbon, from some specific target, would be challenging to defend against an arbitrariness challenge.

A general lesson, with broader implications, is that judicial review of the social cost of carbon should (and likely will) involve a procedural hard look, not a substantive hard look. A procedural hard look is important to defend against failures of both deliberation and democracy; a substantive hard look would strain judicial capacities.

I must again repeat, what the assailants of utilitarianism seldom have the justice to acknowledge, that the happiness which forms the utilitarian standard of what is right in conduct, is not the agent’s own happiness, but that of all concerned. As between his own happiness and that of others, utilitarianism requires him to be as strictly impartial as a disinterested and benevolent spectator. In the golden rule of Jesus of Nazareth, we read the complete spirit of the ethics of utility. To do as one would be done by, and to love one’s neighbour as oneself, constitute the ideal perfection of utilitarian morality.

- **John Stuart Mill**¹

I. Seven Claims

What are the costs of climate change? The standard answer is given by “the social cost of carbon,” or more broadly “the social cost of greenhouse gas emissions,” which is meant to quantify and monetize the harm done by a ton of such emissions.² (For ease of exposition, I shall use the narrower term here.) Sometimes described as “the most important number you’ve never

¹ JOHN STUART MILL, UTILITARIANISM 24 – 25 (2d ed. 1864).

² The literature is vast. See, e.g., National Academies of Sciences, VALUING CLIMATE DAMAGES: UPDATING ESTIMATION OF THE SOCIAL COST OF CARBON DIOXIDE (2017); Katharine Ricke et al., *Country-Level Social Cost of Carbon*, 8 *Nature Climate Change* 895 (2018); William D. Nordhaus, *Revisiting the Social Cost of Carbon*, 114 *PNAS* 1518 (2017), available at <https://www.pnas.org/content/114/7/1518.short>; Tamma Carleton and Michael Greenstone, UPDATING THE UNITED STATES GOVERNMENT’S SOCIAL COST OF CARBON (2021), available at <http://www.impactlab.org/research/updating-the-united-states-governments-social-cost-of-carbon/>; <https://www.nature.com/articles/d41586-021-00441-0>; <https://www.nber.org/papers/w28472>; Kian Mintz-Woo, *Two Moral Arguments for a Global Social Cost of Carbon*, 21 *Ethics, Policy and Environment* 60 (2018); Ted Gayer and W. Kip Viscusi, *Determining the Proper Scope of Climate Change Policy Benefits in U.S. Regulatory Analyses*, Review of Environmental Economics and Policy (2016), available at <https://www.brookings.edu/wp-content/uploads/2016/08/rev-enviro-econ-policy-2016-gayer-reep-rew002.pdf>; Jonathan Masur and Eric A. Posner, *Climate Regulation and the Limits of Cost-Benefit Analysis*, 99 *Cal. L. Rev.* 1557 (2011); Robert S. Pindyck, *The Social Cost of Carbon Revisited*, 94 *J. Env. Ec. and Management* 140 (2019). The Sixth Assessment Report of the International Panel on Climate Change (2021), *Climate Change 2021: The Physical Science Basis*, available at <https://www.ipcc.ch/report/ar6/wg1/#TS>, has a great deal of relevant discussion.

heard of,”³ the social cost of carbon helps determine the stringency of numerous regulations designed to reduce greenhouse gas emissions. With respect to motor vehicles, power plants, and much more, a high number will of course tend to support aggressive regulations, while a low one will tend to support modest regulations.⁴

My principal goal in this Article is to explore the relationship between judicial review of agency action and the social cost of carbon, in a way that is designed, at once, to provide a kind of lawyer’s primer, or guide for the perplexed, and also to defend some general claims about the appropriate role of the federal judiciary in overseeing the operations of the administrative state. As we shall see, the arithmetic of climate change, as we might conceive of it, requires an understanding of the central issues of science and economics that must be assessed in order to justify regulatory choices. For lawyers and judges, coming legal challenges raise institutional problems of the first order, ultimately with constitutional resonances. To see why, it will be useful to begin with one of the greatest battles in the long history of American public law – something like *Ali-Frazier I*, the Fight of the Century.⁵

In the right corner (or was it the left?) stood Chief Judge David Bazelon, architect of much of modern arbitrariness review, a firm advocate of strengthening administrative processes in order to promote legitimacy and to improve outcomes, and a deep skeptic about judicial competence with respect to technical questions. In the left corner (or was it the right?) stood Judge Harold Leventhal, architect of the hard-look doctrine, and a firm advocate of some kind of judicial scrutiny of the merits, to ensure that processes are not a charade, and to promote legitimacy and to improve outcomes.

The debate came to a head in *Ethyl Corp. v. EPA*,⁶ a singularly complex decision that was long featured in administrative law casebooks, because it framed discussions of arbitrariness review so well.⁷ (When my authors and I deleted it from our casebook,⁸ I went through a period of mourning.) The majority opinion was written by Judge J. Skelly Wright, but both Bazelon and Leventhal saw fit to write separately in concurrence. Bazelon summarized his approach to administrative law in two brisk sentences, a kind of *cri du coeur*: “[I]n cases of great technological complexity, the best way for courts to guard against unreasonable or erroneous administrative decisions is not for the judges themselves to scrutinize the technical merits of each decision. Rather, it is to establish a decision-making process that assures a reasoned decision that can be held up to the scrutiny of the scientific community and the public.”⁹

³ Eric Roston, “The Most Important Number You’ve Never Heard Of,” Energy Policy Institute at the University of Chicago (Jan. 22, 2021). <https://epic.uchicago.edu/news/the-most-important-number-youve-never-heard-of/>.

⁴ See Tamma Carleton and Michael Greenstone, UPDATING THE UNITED STATES GOVERNMENT’S SOCIAL COST OF CARBON 3-5 (2021), available at <http://www.impactlab.org/research/updating-the-united-states-governments-social-cost-of-carbon/>

⁵ See Ronald J. Krotoszynski, Jr., *History Belongs to the Winners: The Bazelon-Leventhal Debate*, 58 Admin L. Rev. 995 (2006), available at https://scholarship.law.ua.edu/cgi/viewcontent.cgi?article=1221&context=fac_articles

⁶ 541 F.2d 1 (D.C. Cir. 1976).

⁷ See *id.*

⁸ See STEPHEN G. BREYER ET AL., ADMINISTRATIVE LAW AND REGULATORY POLICY (7th ed. 2019).

⁹ 541 F.2d at 66. On reasoned decision-making, see Jerry L. Mashaw, *Reasoned Administration and Democratic Legitimacy* (2018); Mashaw’s general conception of the administrative state, and his emphasis on the relationships among judicial review, democracy, and reason, fit well with the central argument here.

An entire book could easily be written about that sentence. Judge Bazelon’s approach should be seen as a distinctive answer to the acute anxieties – constitutional and otherwise – about the power and discretion of modern administrative agencies.¹⁰ His approach is a distinctive outgrowth of the period between 1932 and 1974, which included President Franklin Delano Roosevelt’s New Deal, the constitutional challenge to its basic foundations, the enactment of the Administrative Procedure Act, and the rise, largely unanticipated, of notice-and-comment rulemaking as a principal vehicle by which agencies made law and policy.¹¹ After all, administrators are not elected, and they might be influenced by groups with a special interest in the outcome; they might also blunder. When they wield broad discretion, what is the appropriate corrective? Avoiding heavy constitutional artillery,¹² Bazelon answered with “a decision-making process,” in which agencies would exclude no one, listen to a wide variety of people, carefully consider diverse concerns, and offer a reasoned decision, complete with a detailed justification, essentially “showing their work,” and exposing it to public scrutiny and review. Under Bazelon’s approach, that open process, ensured by courts and undertaken by agencies, might be seen as a surrogate safeguard for those processes specified in the Constitution itself.

At the same time, Bazelon rejected the idea that courts should closely scrutinize the merits. He insisted that judges lacked the competence to undertake that task, at least for highly technical issues. As he put it, “The process making a de novo evaluation of the scientific evidence inevitably invites judges of opposing views to make plausible-sounding, but simplistic, judgments of the relative weight to be afforded various pieces of technical data.”¹³ He feared “substantive review of mathematical and scientific evidence by technically illiterate judges,” seeing it as “dangerously unreliable.”¹⁴ For that reason, he argued that judges should restrict themselves to improving “administrative decision-making by concentrating our efforts on strengthening administrative procedures.”¹⁵

Leventhal felt compelled to respond. In his key sentence, he pointed to the constitutional background, urging, “Congress has been willing to delegate its legislative powers broadly — and courts have upheld such delegation because there is court review to assure that the agency exercises the delegated power within statutory limits, and that it fleshes out objectives within those limits by an administration that is not irrational or discriminatory.”¹⁶ (A book could be

¹⁰ On the fundamental issues, see DANIEL R. ERNST, *TOCQUEVILLE’S NIGHTMARE* (2014); JAMES O. FREEDMAN, *CRISIS AND LEGITIMACY* (1980); Richard B. Stewart, *The Reformation of American Administrative Law*, 88 Harv. L. Rev. 1667 (1975). On some of the origins of the anxiety, see Cass R. Sunstein, *Chevron As Law*, 107 Geo. L.J. 1613, 1615-1621 (2019). For important and vivid discussions, see ROSCOE POUND, *ADMINISTRATIVE LAW: ITS GROWTH, PROCEDURE, AND SIGNIFICANCE* 7 (1942); see also *id.* at 132 (“We must bear in mind that the theories of disappearance of law go along with, have developed side by side with, absolute theories in politics. . . . The real foe of absolutism is law.”); Roscoe Pound, *The Place of the Judiciary in a Democratic Polity*, 27 A.B.A.J. 133, 133 (1941)

¹¹ On that phenomenon, see Antonin Scalia, *Vermont Yankee: the APA, the D.C. Circuit, and the Supreme Court*, 1978 Sup. Ct. Rev. 345 (1978).

¹² Some people, of course, would not avoid that artillery. See, e.g., Neomi Rao, *The Hedgehog and the Fox in Administrative Law*, Daedalus (2021), available at <https://www.amacad.org/publication/hedgehog-fox-administrative-law>

¹³ 541 F.2d at 66.

¹⁴ *Id.* at 67.

¹⁵ *Id.*

¹⁶ *Id.* at 68.

written about that sentence as well.) Judicial review is not “ephemeral.”¹⁷ It is true that some issues are highly technical, but “[o]ur present system of review assumes judges will acquire whatever technical knowledge is necessary as background for decision of the legal questions.”¹⁸ His evident concern was that unless judges scrutinized the merits, the process could be a charade. Hence his concluding sentence: “Restraint, yes, abdication, no.”¹⁹

It is important to see that although their disagreement was genuine, Bazelon and Leventhal did not traffic in absolutes. Bazelon did not favor “abdication”; he could not and did not think that courts should refuse to ask whether agency decisions were arbitrary on the merits. (If an agency decided that two plus two equals five, Bazelon would not uphold its decision.) For his part, Leventhal did not favor de novo review; he understood that agencies had technical advantages and that courts are not policymakers. (“Restraint, yes.”) The difference is one of degree. But Bazelon favored greater humility and more restraint than Leventhal did, at least when it came to hard or technical issues involving policy and fact. That is an important difference.

Flash forward to the present – and to one of the largest issues of the day. Under Executive Orders 12866²⁰ and 13563,²¹ agencies are required to quantify the costs and benefits of their regulations, and to proceed, to the extent permitted by law, only if the benefits justify the costs. But

My substantive topic here is judicial review of the social cost of carbon – in particular, judicial review of the relevant questions for “arbitrariness.”²² My central claim is that in an important sense, Judge Bazelon was correct, at least in this domain. Courts should police agency decisions, with respect to the social cost of carbon, to ensure that agencies have taken the scientific and economic issues seriously; should require a detailed justification; should require a response to reasonable objections; and should require an explanation for departures from past practices. Mere conclusions are never enough. At the same time, judicial review of the merits should be deferential. Of course, and importantly, courts should not “abdicate.” But in this domain, a strong dose of “restraint” is in order.

As we shall see, these claims raise fundamental questions about the role of science, economics, and politics in judicial review of agency action, and about the relationship between courts and the administrative state.²³ By virtue of its concreteness, the topic greatly sharpens those questions. As we shall also see, modern arbitrariness review should be understood as a

¹⁷ Id.

¹⁸ Id.

¹⁹ Id. at 69. It is widely believed that *Vermont Yankee Nuclear Power Co. v. NRDC*, 435 U.S. 519 (1978), essentially rejected Judge Bazelon’s approach by holding that courts cannot impose procedural requirements beyond those in the APA. See Krotoszynski, *supra* note 2. Yes and no (as Krotoszynski also shows). As we shall see, reports of the death of Judge Bazelon’s approach have been greatly exaggerated. In short: Courts cannot explicitly mandate procedures as such – but arbitrariness review, in its current form, does turn out to mandate them (indirectly).

²⁰ 58 Fed. Reg. 51735 (1993).

²¹ 76 Fed. Reg. 3821 (2011).

²² See 5 U.S.C. 706.

²³ Valuable discussions, compatible with that offered here, are Mashaw, *supra* note 6; Benjamin Eidelson, *Reasoned Explanation and Political Accountability in the Roberts Court*, 130 Yale L.J. 1748 (2021).

central instrument toward promoting *deliberative democracy* – a system, with deep roots in the U.S. constitutional tradition, that combines reason-giving and popular accountability.²⁴ In its modern form, a deliberative democracy places a significant emphasis on both science and economics; arbitrariness review call for invalidation of agency decisions that do not attend to relevant scientific and economic findings. It is never enough to ignore or override those findings on the ground that “elections have consequences.” Nor is it enough to point to some authoritative direction, even if it comes from the president personally.

At the same time, a deliberative democracy makes a great deal of space for policy judgments so long as they are actually articulated, made visible and subject to public scrutiny, and consistent with statute.²⁵ The provisos here are important and hence worth underlining: For purposes of arbitrariness review (and the rule of law in general), “politics” – an ambiguous and vexing term – does not and cannot mean policy preferences, taken as such, or sheer political will. But as we shall see, it could refer to judgments of value, if they are offered in public²⁶ and if they do not transgress statutory requirements. Understood in these terms, arbitrariness review, by virtue of its connection with deliberative democracy, helps to legitimate the modern regulatory state, and to connect it with time-honored ideals.²⁷

More particularly, I aim to defend these propositions:

1. To specify the social cost of carbon, agencies must make a series of substantive choices, and to survive judicial scrutiny, each of them requires a reasoned justification, with close reference to science, economics, or both.²⁸ That is a serious constraint on the discretion of the executive branch and on the potential role of “politics.” It would not be enough, for example, to refer to an Executive Order or to defer to guidance from the Office of Management and Budget,²⁹ except to the extent that any such document includes a reasoned justification.
2. A decision to use the domestic number, as opposed to the global number, would be challenging to defend against an arbitrariness challenge.³⁰ A decision to use the global number, as opposed to the domestic number, should not be challenging to defend against such a challenge.
3. A decision to use a low discount rate, such as two percent, would be straightforward to defend against an arbitrariness challenge; a decision to use a high discount rate, such as

²⁴ See DELIBERATIVE DEMOCRACY (Jon Elster ed. 1998); THE OXFORD HANDBOOK OF DELIBERATIVE DEMOCRACY (Andrae Bachtiger et al. eds 2007); JURGEN HABERMAS, BETWEEN FACTS AND NORMS (1998); JOSEPH M. BESSETTE, THE MILD VOICE OF REASON (1997).

²⁵ See Eidelson, *supra* note 23.

²⁶ See *id.*; *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2020).

²⁷ See Mashaw, *supra* note 6. Of course, it is only a part of the system. For some of the fundamentals, see CASS R. SUNSTEIN AND ADRIAN VERMEULE, LAW AND LEVIATHAN (2020). The goal here, by the way, is not the celebrate all aspects of the status quo; the project of promoting deliberative democracy, and associated ideals, is very much a work in progress.

²⁸ See *Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29 (1983); *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2020). For a valuable treatment, see Matthew J. Kotchen, *Which Social Cost of Carbon? A Theoretical Perspective*, 5 J. of the Association of Env. and Resource Economics 673 (2018).

²⁹ For the prevailing guidance, see OMB Circular A-4, 68 Fed. Reg. 58366 (2003).

³⁰ On some of the issues here, see Kotchen, *supra* note 28.

seven percent, would be exceedingly difficult to defend against an arbitrariness challenge.³¹

4. A wide range of decisions about difficult questions in science and economics should be straightforward to defend against an arbitrariness challenge, but only if they follow from a reasoned justification.
5. Approaches that take account of equity – including “prioritarianism”³² – should be defensible against an arbitrariness challenge, as should be a refusal to adopt such approaches, but here again, a reasoned justification is required.
6. A decision to “back out” a social cost of carbon, from some specific target, would be challenging to defend against an arbitrariness challenge,³³ though it might be defensible as a policy judgment designed to achieve a national policy goal.
7. This is an area in which a “procedural hard look,” to be explained below, makes a great deal of sense, and in which a “substantive hard look,” also to be explained below, does not make much sense. Here, then, is a domain in which Judge Bazelon’s approach, suitably modified, is preferable to Judge Leventhal’s.

Now for the details.

II. Deliberative Democracy and Arbitrariness Review

As we shall see, judicial review of any social cost of carbon could raise a number of concrete issues. But here, as elsewhere, the background is as important as the foreground.³⁴ The background is provided by modern arbitrariness review, which can be seen as fundamental guarantee of both accountability and deliberation. In its ideal form, it is a contemporary incarnation of the constitutional commitment to “deliberative democracy” – one that combines reason-giving with an insistence on a degree of popular control.³⁵ Reason-giving requires genuine deliberation, in which science and economics are taken seriously, competing perspectives are engaged, counterarguments are explored, and alternatives are given serious consideration. For its part, popular control requires a degree of transparency, in the sense that agency rationales are actually offered to the public; it also requires public engagement, in the sense that comments are sought and given genuine attention. In an area in which administrative authority and open-ended discretion are being subjected to skeptical scrutiny on constitutional grounds,³⁶ modern arbitrariness review can be seen as response and perhaps as a corrective. It

³¹ See Tamma Carleton and Michael Greenstone, *UPDATING THE UNITED STATES GOVERNMENT’S SOCIAL COST OF CARBON* (2021), available at <http://www.impactlab.org/research/updating-the-united-states-governments-social-cost-of-carbon/>

³² See *PRIORITARIANISM IN PRATICE* (Matthew D. Adler and Ole F. Norheim eds., forthcoming 2022).

³³ See Nicholas Stern and Joseph E. Stiglitz, *The Social Cost of Carbon, Risk, Distribution, Market Failures: An Alternative Approach* (2021), available at <https://www.nber.org/papers/w28472>

³⁴ For a useful overview, with a particular focus on deregulation, see Merrick B. Garland, *Deregulation and Judicial Review*, 98 Harv. L. Rev. 505 (1985).

³⁵ See JURGEN HABERMAS, *BETWEEN FACTS AND NORMS* (1996); *DELIBERATIVE DEMOCRACY* (Jon Elster ed. 1998); JOSEPH M. BESSETTE, *THE MILD VOICE OF REASON* (1997); Cass R. Sunstein, *Interest Groups in American Public Law*, 38 Stan. L. Rev. 29 (1985); Cass R. Sunstein, *Beyond the Republican Revival*, 97 Yale L.J. 1539 (1988).

³⁶ See Rao, *supra* note 9. An outline can be found in CASS R. SUNSTEIN AND ADRIAN VERMEULE, *LAW AND LEVIATHAN* (2020).

might be even seen as a surrogate safeguard for the protections of Articles I, II, and III of the Constitution.³⁷

A. APA: Text, History, and Mood

There is a long and complex history here, in which arbitrariness review was built up in common-law fashion, with the Bazelon-Leventhal debate playing an important part.³⁸ Congress, of course, has the authority to decide on the content of arbitrariness review, and the initial question is what the Administrative Procedure Act³⁹ requires. Notwithstanding the Bazelon-Leventhal debate, which is grounded on judgments about institutional capacities, it is important to ask: What would such review look like if we insisted on Administrative Procedure Act originalism – that is, if we insisted that the statute should be interpreted in accordance with its original meaning⁴⁰?

The answer is not at all straightforward. When the APA was originally drafted, the only scope of review issue that received real attention in the legislative history was the “substantial evidence” standard, applicable to on-the-record proceedings (adjudication of course, but also formal rulemaking). The ultimate product, on which the legislative history is quite detailed, was section 706(2)(E), which requires courts “to hold unlawful and set aside agency action . . . unsupported by substantial evidence in a case subject to sections 556 and 557 of this title or otherwise reviewed on the record of an agency hearing provided by statute.”⁴¹ That provision was written against a backdrop that included significant concern about the level of power and discretion wielded by administrative agencies.⁴² As the Supreme Court recognized in *Universal Camera*,⁴³ section 706(2)(E) of the APA was understood to heighten the intensity of judicial review of agency determinations of fact. The Court put it memorably: “Congress expressed a mood,”⁴⁴ directing courts to “assume more responsibility for the reasonableness and fairness of

³⁷ For a brisk treatment from a very young man, see Cass R. Sunstein, *In Defense of the Hard Look*, 7 Harv. J. Law and Pub. Pol’y 51 (1984), available at

https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=12174&context=journal_articles

³⁸ See Harold Leventhal, *Environmental Decisionmaking and the Role of the Courts*, 122 U. Pa. L. Rev. 509 (1974); Merrick B. Garland, *Deregulation and Judicial Review*, 98 Harv. L. Rev. 505 (1995);

https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=12174&context=journal_articles.

³⁹ 5 U.S.C. 701 et seq.

⁴⁰ See Evan D. Bernick, *Envisioning Administrative Procedure Act Originalism*, 70 Admin. L. Rev. 807 (2018).

⁴¹ 5 U.S.C. 706(2)(E).

⁴² See, e.g., Legislative History, Administrative Procedure Act, S. Doc. No. 248, 79th Cong., 2d Sess. 48 (concern that agencies threaten “to develop a ‘fourth branch’ of the Government for which there is no sanction in the Constitution”); id. at 305 (“I desire to emphasize . . . the provisions for judicial review, because it is something in which the American public has been and is much concerned, harkening back, if we may, to the Constitution of the United States, which sets up the judicial branch of the Government for the redress of human wrongs”); id. at 217 (“the enforcement of the bill, by the independent judicial interpretation and application of its terms, is a function which is clearly conferred upon the courts . . . Judicial review is of utmost importance . . . It is indispensable since its mere existence generally precludes the arbitrary exercise of powers not granted”); id. at 311; id. at 312; id. at 382-85. For contemporaneous commentary to the same effect, see, e.g., Sherwood, *The Federal Administrative Procedure Act*, 41 Am. Pol. Sci. Rev. 271 (1947), and sources cited; Dickinson, *Administrative Procedure Act: Scope and Grounds of Broadened Judicial Review*, 33 A.B.A.J. 434 (1947); McCarran, *Improving “Administrative Justice”: Hearings and Evidence; Scope of Judicial Review*, 32 A.B.A.J. 827 (1945).

⁴³ *Universal Camera Corp. v. NLRB*, 340 U.S. 474 (1951).

⁴⁴ Id. at 487.

Labor Board decisions than some courts have shown in the past. Reviewing courts must be influenced by a feeling that they are not to abdicate the conventional judicial function. Congress has imposed on them responsibility for assuring that the Board keeps within reasonable grounds.”⁴⁵

So far, so good. But what about section 706(2)(A), which tells courts to “hold unlawful and set aside agency action” that is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law”⁴⁶? This is the provision that governs scope of review of agency decisions that are not made on the record; notice-and-comment rulemaking may be the most prominent domain to which section 706(2)(A) applies. The puzzle, of course, is the meaning of “arbitrary, capricious, [or] an abuse of discretion.” Does that language call for a very soft look, in the form of (for example) an examination of whether an agency made a truly obvious error? Or does it support Judge Bazelon’s approach, or perhaps Judge Leventhal’s? On these questions, the text is not clear; it could mean a number of things. On one view, we might want to consult dictionary definitions of the relevant terms, perhaps as they were understood in 1946. The word “arbitrary” has sometimes been understood to mean “existing or coming about seemingly at random or by chance or as a capricious and unreasonable act of will.”⁴⁷ A definition of that kind might well be taken to support little in the way of judicial scrutiny. An agency might be incompetent without deciding “seemingly at random,” or as a mere “act of will.” But is that really what “arbitrary” means here?

In the lengthy legislative history of the APA, this phrase receives little elaboration.⁴⁸ One clue, or so we might think, is that in explaining the nature of arbitrariness review, the legislative history makes reference to “the minimum requisite under the Constitution” and to due process cases⁴⁹ (!) – which might well incline modern readers to think that if we are APA originalists, arbitrariness review is deferential indeed (because due process rationality review is deferential indeed⁵⁰). But the thought should be resisted.⁵¹ First, those cases were from the *Lochner* period,

⁴⁵ Id. at 490.

⁴⁶ 5 U.S.C. 706(2)(A).

⁴⁷ <https://www.merriam-webster.com/dictionary/arbitrary>.

⁴⁸ Some of it is described in Raoul Berger, *Administrative Arbitrariness and Judicial Review*, 65 Colum. L. Rev 55 (1965), and Raoul Berger, *Administrative Arbitrariness: A Synthesis*, 78 Yale L.J. 965 (1969). Berger’s main focus is on the question whether abuses of discretion are sometimes immune from judicial review; his answer is that they are not. This conclusion is rejected in *Citizens to Preserve Overton Park v. Volpe*, infra note 63. Berger compiles materials that suggest intense congressional antipathy to arbitrary action on the part of administrators, see 65 Colum. L. Rev. at 62 – 65, but those materials do not specify what arbitrary action *is*. Is it arbitrary, for example, to conclude that a chemical is carcinogenic, when most scientists disagree? To conclude that exposure to an air pollutant does not have a safe threshold when there is evidence that it does? To embrace a conclusion, with respect to the likelihood of adaptation of a warmer world, that is highly pessimistic, or highly optimistic?

⁴⁹ See the bland and general suggestion that the scope of review provision would “restate the several categories of questions of law subject to judicial review ... The several categories, constantly repeated by courts in the course of judicial decisions or opinions, were first established by the Supreme Court as the minimum requisite under the Constitution and have also been carried into State practice, in part at least, as the result of the identical due process clause of the Fourteenth Amendment, applicable to the States, and the Fifth Amendment, applicable to the Federal Government.” Senate Judiciary Committee Print (1945), as reproduced in Legislative History, Administrative Procedure Act, S. Doc. No. 248, 79th Cong., 2d Sess. 39 (1946) (citations omitted).

⁵⁰ See *Ferguson v. Skrupa*, 372 U.S. 726 (1963).

⁵¹ The issue was raised, and the Supreme Court quickly settled it, in a footnote in *State Farm*, 463 U.S. at 43 n.9: “The Department of Transportation suggests that the arbitrary and capricious standard requires no more than the

when rationality review under the due process clause was not nearly as deferential as it is today.⁵² Second, it was anticipated, at the time that the APA was drafted and enacted, that important agency decisions would be made through adjudication, not notice-and-comment rulemaking.⁵³ In fact the rise of notice-and-comment rulemaking, as a principal vehicle by which agencies find facts and make policies, did not begin until the 1970s.⁵⁴ In these circumstances, it might seem perverse, and a betrayal of the “mood” that Congress “expressed” in 1946, to understand the word “arbitrary” to suggest very thin or weak judicial review of important agency judgments of policy and fact. Indeed, there is an argument that a relatively aggressive understanding of judicial review for arbitrariness, broadly akin to substantial evidence review as it was understood at the time of the enactment of the APA, fits far better with the goals of the APA’s drafters than would a very soft look, or something like modern due process rationality review.⁵⁵

In view of the ambiguity of the text and history, it is reasonable to take section 706(2)(A), in its context, as a general concept and not as a particular conception.⁵⁶ Congress did not specify it, and it did not have a concrete public meaning. To be sure, some interpretations of the word “arbitrary” would be out of bounds. A court could not plausibly deem an agency’s decision to be arbitrary simply because it disagreed with it; there is a difference between arbitrariness review and de novo review. So too, a court could not plausibly uphold an agency’s decision that rested on a clear arithmetic error or an unambiguous mistake of logic; any such decision would necessarily count as arbitrary. Nor would it be right to deem an agency’s decision to be arbitrary if and only if it rested on a clear arithmetic error or an unambiguous mistake of logic; in context, the term has to be broader than that. But apart from these obvious points, courts have to do some specifying.

B. A Very Brief Note on Institutional Competence

By reference to what criteria might they do that? There is no escaping some judgments about institutional competence – about who is good at what. Abstractions about political ideals – about deliberative democracy – are relevant, but they are not sufficient.⁵⁷ If we made certain judgments about institutional capacities, we might love deliberative democracy but abhor

minimum rationality a statute must bear in order to withstand analysis under the Due Process Clause. We do not view as equivalent the presumption of constitutionality afforded legislation drafted by Congress and the presumption of regularity afforded an agency in fulfilling its statutory mandate.”

⁵² See *Lochner v. New York*, 198 U.S. 45 (1905).

⁵³ See Antonin Scalia, *Vermont Yankee: the APA, the DC Circuit, and the Supreme Court*, 1978 Sup. Ct. Rev. 345 (1978).

⁵⁴ See *id.*

⁵⁵ Cf. then-Professor Scalia’s memorable words in *id.* at 381 (emphasis added): “In sum, there seems to me little to be said for the Supreme Court’s assumption that its *Vermont Yankee* opinion represents a firm adherence to the ‘settlement’ of the APA. That is so only if one considers the APA’s abstract principles rather than the concrete dispositions it was expected to produce and, then, only if one considers those principles in isolation from related assumptions which the Supreme Court itself has since drastically altered. *It is ironic but true that the D.C. Circuit’s irreverent approach to the text of the APA served to render the nature of agency resolution of particular issues, and the nature of judicial review, closer to what was the expectation in 1946.*”

⁵⁶ Cf. John Rawls, *A THEORY OF JUSTICE* 9 (1971); in the legal context, see Ronald Dworkin, *LAW’S EMPIRE* (1985).

⁵⁷ On the general point, see Cass R. Sunstein and Adrian Vermeule, *Interpretation and Institutions*, 101 Mich. L. Rev. 885 (2003).

arbitrariness review. If agencies were perfect and incapable of error, there would be no need for judicial review at all; such review would impose costs in the form of decision costs, and it would not be necessary to correct errors (by stipulation). To be sure, we would still want transparency, in the sense of public justifications, in which agencies state their reasons. But if agencies are perfect, they will be transparent in that sense.

If we made other judgments, we might love deliberative democracy and want to convert arbitrariness review into something like de novo review: If judges were unerring, and if agencies were systematically incompetent (or pervasively subject to the power of well-organized groups), de novo review might well be a good idea. Such review would produce no errors (by stipulation), and it would be necessary to prevent a large number of them (also by stipulation). Within the boundaries set by the text, any conception of arbitrariness review, and any resolution of the Bazelon-Leventhal debate, must depend on judgments about who is best at what, and who is likely to be worst at what. And indeed, Bazelon and Leventhal, and those who agree or disagree with them, are inevitably making such judgments.

C. Hard Look Review: Procedural and Substantive

When modern arbitrariness review was initially developed, many of the relevant cases involved environmental protection; as Judge Leventhal put it in 1974, “The law of environment now seems suddenly ablaze, a development which has taken place essentially within the last five years.”⁵⁸ In the 1970s, federal courts understood arbitrary and capricious review to entail a “hard look doctrine,”⁵⁹ though Judges Bazelon and Leventhal understood it in different ways. In its original form, the hard look doctrine meant that reviewing courts would merely require agencies themselves to take a hard look at the problem, perhaps through imposing procedural requirements that would produce elaborate explanations for their choices.⁶⁰ Though chastened and reoriented by *Vermont Yankee*,⁶¹ that idea continues today in a distinctive form.⁶² We might call this a “procedural hard look” – procedural in the sense that it need not entail a close judicial examination of substantive issues.

So understood, the procedural hard look can be quite probing.⁶³ This is so even if we agree with Judge Bazelon and insist that the court’s ultimate role in assessing the merits is quite limited. Under the procedural hard look in its modern incarnation,⁶⁴ courts require agencies to offer (1) detailed justifications for their decisions⁶⁵; (2) careful attention to alternatives⁶⁶; (3) responses to public comments; (4) consideration of reliance interests⁶⁷; and (5) explanations for

⁵⁸ Leventhal, *supra* note 38, at 509.

⁵⁹ See Cass R. Sunstein, *Deregulation and the Hard-Look Doctrine*, 1983 Sup. Ct. Rev. 177 (1983).

⁶⁰ See Leventhal, *supra* note 38.

⁶¹ *Vermont Yankee v. NRDC*, 435 U.S. 519 (1978).

⁶² See, e.g., *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2020).

⁶³ The word is used in *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402 (1971). But see Gersen and Vermeule, *infra* note 76 (arguing that rationality review is generally “thin” in the sense of deferential).

⁶⁴ *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2019).

⁶⁵ *Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29 (1983).

⁶⁶ *Id.*

⁶⁷ *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2020).

departures from past practices.⁶⁸ Standing by itself, the procedural hard look does not involve close judicial scrutiny of the merits (and hence can be taken to bring on board Judge Bazelon’s concerns about judicial competence on technical matters). So long as agencies have done what is required by (1), (2), (3), (4) and (5), they will prevail unless their error is (or their errors are) quite clear.

At the same time, the hard look doctrine sometimes means that courts will themselves take a hard look at reasonableness of the agencies’ choices.⁶⁹ As Judge Leventhal gently put it long ago, courts “have a role of review which has been of major significance.”⁷⁰ That proposition remains true today.⁷¹ An agency’s decision will be struck down as arbitrary if its decision does not make substantive sense – for example, because the agency has not engaged reliance interests, because the costs of its decision are far in excess of its benefits, or because the agency’s judgment, with respect to policy or fact, is plainly wrong.⁷²

In the *State Farm* case, which has come to define the field, the Court endorsed both the procedural and the substantive hard look:⁷³

Normally, an agency rule would be arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise. The reviewing court should not attempt itself to make up for such deficiencies: We may not supply a reasoned basis for the agency’s action that the agency itself has not given.

The first two parts of this test speak in terms of the procedural hard look: “if the agency [1] has relied on factors which Congress has not intended it to consider [or] [2] entirely failed to consider an important aspect of the problem.” This is not quite a requirement of additional procedures, an idea that the Court rejected in *Vermont Yankee*.⁷⁴ Nonetheless, the requirements do have procedural consequences: Agencies have to offer detailed explanations, and they have to show their work. The last two parts of the test are more substantive and seem to embrace some version of Judge Leventhal’s views: “[1] offered an explanation for its decision that runs counter to the evidence before the agency, or [2] is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.” More particularly, the various rulings in

⁶⁸ *Federal Communications Commission v. Fox Television Stations, Inc.*, 556 U.S. 502 (2009).

⁶⁹ For evidence from different eras, see *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402 (1971); *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2020).

⁷⁰ Leventhal, *supra* note 38, at 510.

⁷¹ *Department of Homeland Security v. Regents of the University of California*, 140 S. Ct. 1891 (2020)

⁷² *Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29 (1983), reflected the “substantive hard look” insofar as the Court struck down as arbitrary the agency’s decisions with respect to detachable and nondetachable seatbelts. For a decision on the border between the procedural and substantive hard look, see *Michigan v. EPA*, 576 U.S. 743 (2015) (striking down an EPA decision to proceed without attending to costs).

⁷³ *Motor Vehicle Manufacturers Association v. State Farm Mutual Automobile Insurance Co.*, 463 U.S. 29 (1983).

⁷⁴ *Vermont Yankee v. NRDC*, 435 U.S. 519 (1978)

the *State Farm* case, striking down the Department of Transportation’s decision not to proceed with its passive restricts regulations, were based on an unmistakably hard look.⁷⁵

On some questions, however, the Court has sounded like Judge Bazelon and given a clear signal of deference on the merits – a kind of “soft look doctrine.”⁷⁶ In the *Baltimore Gas* case, for example, the Court seemed to apply a very soft look, emphasizing, “It is not our task to determine what decision we, as Commissioners, would have reached. Our only task is to determine whether the Commission has considered the relevant factors and articulated a rational connection between the facts found and the choice made.”⁷⁷ In context of the controversy before the Court, involving highly technical issues related to the disposal of spent nuclear fuel, this was not a demanding standard of review.⁷⁸ As we shall soon see, the social cost of carbon also raises highly technical issues, and in the absence of some patent failure to address a relevant consideration, or some obvious mistake, a court might well be inclined to avoid a substantive hard look, at least, and to refer to the technical complexity to uphold the agency’s decision.

At the same time, the Court has given some strong signals that it will take arbitrariness review seriously, especially when the issue is not highly technical and the stakes are high. *Department of Homeland Security v. Regents of the University of California*⁷⁹ can be taken as exemplary, and it might well be a harbinger of what is to come. In that case, the Court struck down the decision of the Department of Homeland Security to terminate the Deferred Action for Childhood Arrivals. To be sure, the case involved a procedural rather than substantive hard look, but we might understand it as a procedural hard look with a vengeance. The Court’s decision was based in part on the ground that the Secretary had terminated the entire DACA program without considering whether to eliminate one part (involving eligibility for various benefits) while retaining another (involving forbearance from deportation).⁸⁰ The Court also emphasized the Secretary’s failure to give attention to reliance: “She should have considered whether she had similar flexibility in addressing any reliance interests of DACA recipients.”⁸¹

For those who are skeptical of a strong judicial role, rulings of this kind might seem hubristic.⁸² But a signal virtue of arbitrariness review, as those cases understand it, is that it reduces the risk of large-scale instability in government, in which judgments of fact, including scientific and economic judgments, are overridden by purely political considerations.⁸³ The

⁷⁵ See note supra 72.

⁷⁶ See Jacob Gersen and Adrian Vermeule, *Thin Rationality Review*, 114 Mich. L. Rev. 1355 (2016).

⁷⁷ *Baltimore Gas & Electric Co. v. NRDC*, 462 U.S. 87, 105 (1983)

⁷⁸ See *id.*; Gersen and Vermeule, *supra* note 76.

⁷⁹ 140 S. Ct. 1891 (2020).

⁸⁰ *Id.* at 1912.

⁸¹ *Id.* at 1914.

⁸² See Gersen and Vermeule, *supra* note 76.

⁸³ An arguably competing vision can be found in *Federal Communications Commission v. Fox Television Stations, Inc.*, 556 U.S. 502 (2009), in which the Court seemed to signal receptivity to new judgments of value, so long as they are actually articulated. The Court wrote that an agency

need not demonstrate to a court’s satisfaction that the reasons for the new policy are *better* than the reasons for the old one; it suffices that the new policy is permissible under the statute, that there are good reasons for it, and that the agency *believes* it to be better, which the conscious change of course adequately indicates. This means that the agency need not always provide a more detailed justification than what

requirement of an articulated justification, attentive to factual questions and explicit about judgment of value, reduces the permissibility and hence the likelihood of abrupt swings from one administration to the next. Of course it is not clear, in the abstract, whether and when such swings are desirable. If one administration has made an egregious mistake on the science, an abrupt swing might be something to celebrate. And if a new administration makes a judgment of value that is consistent with statute, and publicly articulated, we might be willing to celebrate as well. After all, ours aspires to be a deliberative *democracy*, in which new judgments of value are much more than a merely permissible factor in rulemaking.

However that may be, it is fair to regard both *State Farm* and *Regents* as clear indications of occasional judicial willingness to give careful scrutiny to agency policy choices, with the goal of promoting both accountability⁸⁴ and deliberation. In many cases, however, the Supreme Court has been highly deferential.⁸⁵ Within the lower courts, the real world of arbitrariness review has yet to be adequately canvassed; it would be most valuable to see the roles of a soft look, a procedural hard look, and a substantive hard look in judicial review of agency actions across domains. One study finds substantial invalidation rates for cases involving the Environmental Protection Agency and the National Labor Relations Board; more than one-quarter of the time, courts of appeals strike down agency decisions in the face of an arbitrariness challenge.⁸⁶ At the very least, it can be said that the hard look doctrine, as a reading of arbitrariness review, serves as a looming cloud over federal rulemaking.

III. The Social Cost of Carbon: Historical Notes

The development of a social cost of carbon by the U.S. government is a complex tale, with many twists and turns. To orient the discussion, I restrict myself to the highlights here.

A. 2010-2016

The initial guidance, coming in the form of a Technical Support Document (TSD), was issued by the Interagency Working Group (IWG) on the Social Cost of Carbon in 2010.⁸⁷ The IWG, which I helped to convene, and which was headed by the Council of Economic Advisers

would suffice for a new policy created on a blank slate. Sometimes it must—when, for example, its new policy rests upon factual findings that contradict those which underlay its prior policy; or when its prior policy has engendered serious reliance interests that must be taken into account. *Smiley v. Citibank (South Dakota), N. A.*, 517 U. S. 735, 742 (1996). It would be arbitrary or capricious to ignore such matters. In such cases it is not that further justification is demanded by the mere fact of policy change; but that a reasoned explanation is needed for disregarding facts and circumstances that underlay or were engendered by the prior policy.

Id. at 515 – 516.

⁸⁴ See Benjamin Eidelson, *Reasoned Explanation and Political Accountability in the Roberts Court*, 130 Yale L.J. 1748 (2021).

⁸⁵ See Gersen and Vermeule, *supra* note 76.

⁸⁶ See Thomas J. Miles and Cass R. Sunstein, *The Real World of Arbitrariness Review*, 75 U. Chi. L. Rev. 761 (2008).

⁸⁷ Interagency Working Group 2010; Michael Greenstone et al., *Developing A Social Cost of Carbon for US Regulatory Analysis*, 7 Rev. of Environmental Ec. and Policy 23 (2011); Masur and Posner, *supra* note 19.

(CEA) and the Office of Management and Budget (OMB),⁸⁸ included a wide array of agencies: CEA, the Council on Environmental Quality, the Department of Agriculture, the Department of Commerce, the Department of Energy, the Department of Transportation, the Environmental Protection Agency, the National Economic Council, the Office of Energy and Climate Change, OMB, the Office of Science and Technology Policy, and the Department of the Treasury. The discussions were lengthy and spirited, focusing entirely on technical questions in science and economics.⁸⁹ (Politics played no role, as the General Accounting Office ultimately found.⁹⁰ In fact the absence of a role for politics was startling, at least in retrospect.) The resulting document describes the monetary value of reductions in carbon emissions in a way that bears on a large number of regulatory judgments.⁹¹ In 2010, the United States did, in a sense, “put a price on carbon.”

Perhaps the central decision of the IWG was to build on the three leading “integrated assessment models” (IAMs), rather than to question them seriously or to attempt to make novel scientific judgments.⁹² The three models are called DICE (Dynamic Model of Integrated Climate and the Economy),⁹³ FUND (Climate Framework for Uncertainty, Negotiation and Distribution),⁹⁴ and PAGE (Policy Analysis of the Greenhouse Effect).⁹⁵ These models attempt to specify the damage done by greenhouse gas emissions; they rely on both science and economics. If the goal is to monetize that damage, they provided (and continue to provide) a place to start.⁹⁶ Nonetheless, the IAMs are highly controversial in terms of both science and economics; many people believe they depend on a great deal of guesswork.⁹⁷ Aware of these objections (to which I will return), the IWG believed that reliance on the three models reflected a degree of neutrality and avoided some of the difficult judgments that might come from having to pick and choose. In particular, the IWG believed that at the time, the U.S. government was not in a strong position to undertake its own scientific and economic assessments and to generate wholly independent judgments about the social cost of carbon.

⁸⁸ From 2009 to 2012, I served as Administrator of the Office of Information and Regulatory Affairs, which is part of the Office of Management and Budget. The Technical Working Group was convened by the Council of Economic Advisers and by the Office of Management and Budget.

⁸⁹ This focus is noticed and criticized in Masur and Posner, *supra* note 19, at 1577, which deplores “its failure to recognize the political nature of certain issues, treating them instead as technical matters.” (I do not believe that this objection is convincing, but I am biased, and it is always hazardous to disagree with Masur and Posner.)

⁹⁰ See U.S. Government Accountability Office, *Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates* (2014), available at <https://www.gao.gov/assets/gao-14-663.pdf>

⁹¹ See Greenstone et al., *supra* note 87.

⁹² For details, including departures from the IAMs in certain respects, see Greenstone et al., *supra* note 87; Masur and Posner, *supra* note 19.

⁹³ William D. Nordhaus, *Economic Aspects of Global Warming*, 107 PNAS 11721 (2010).

⁹⁴ David Anthoff and Richard Tol, *The Income Elasticity of the Impact of Climate Change*, in *IS THE ENVIRONMENT A LUXURY? : AN INQUIRY INTO THE RELATIONSHIP BETWEEN ENVIRONMENT AND INCOME* 34 (Silvia Tiezzi ed. 2014).

⁹⁵ See Chris Hope, *The Social Cost of CO2 from PAGE09 Model* (2011), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1973863

⁹⁶ See Greenstone et al., *supra* note 87.

⁹⁷ See Robert S. Pindyck, *Climate Change Policy: What Do The Models Tell Us?* (2013), available at <https://www.nber.org/papers/w19244>; Robert S. Pindyck, *The Use and Misuse of Models for Climate Policy* (2015), available at <https://www.nber.org/papers/w21097>

Apart from its reliance on the three leading IAMs, the TSD offered detailed discussions of its various judgments.⁹⁸ A key issue involved discount rates and climate change. The TSD began by noting the well-known differences between (1) prescriptive approaches, which are founded on normative judgments, grounded in ethical considerations and (2) descriptive ones, which attempt to rely on market evidence about how people actually value the future.⁹⁹ The TSD chose to rely “primarily on the descriptive approach to inform the choice of discount rate. With recognition of its limitations, we find this approach to be the most defensible and transparent given its consistency with the standard contemporary theoretical foundations of benefit-cost analysis and with the approach required by OMB’s existing guidance.”¹⁰⁰ At the same time, the TSD stated that “the interagency group has been keenly aware of the deeply normative dimensions of both the debate over discounting in the intergenerational context and the consequences of selecting one discount rate over another.”¹⁰¹

With these points in view, the TSD opted for three discount rates, designed to span a plausible range of certainty-equivalent rates: 2.5, 3, and 5 percent. Its “central value” was 3 percent. The TSD explained that 3 percent corresponds to the after-tax riskless interest rate and that 5 percent reflects “the possibility that climate damages are positively correlated with market returns” and “may be justified by the high interest rates that many consumers use to smooth consumption across periods.”¹⁰² The low value of 2.5 percent was used to reflect the uncertainty of interest rates over time,¹⁰³ and also to acknowledge “ethical objections that have been raised about rates of 3 percent or higher.”¹⁰⁴

Crucially, the TSD adopted a global, rather than merely domestic, measure of damages; harms from U.S. emissions to people in China, Europe, Africa, India, and elsewhere are counted.¹⁰⁵ At various stages during the Obama administration, that issue received a great deal of attention. In 2010, the TSD noted that climate change involves “a global externality,” that it “presents a problem that the United States alone cannot solve,” and that “the United States has been actively involved in seeking international agreements to reduce emissions and in encouraging other nations, including emerging major economies, to take significant steps to reduce emissions.”¹⁰⁶

⁹⁸ Masur and Posner, *supra* note 19, offer a clear treatment.

⁹⁹ See David A. Weisbach and Cass R. Sunstein, *Climate Change and Discounting the Future: A Guide for the Perplexed*, 27 *Yale L. & Pol’y Rev.* 433 (2009), available at <https://digitalcommons.law.yale.edu/ylpr/vol27/iss2/6/>. The distinction is a simplification; any number has to be justified on normative (ethical) grounds, which is to say that the descriptive approach does as well. On the underlying issues, see J. Paul Kelleher, *Descriptive Versus Prescriptive Discounting in Climate Change Policy Analysis*, 15 *Geo. J. of Law of Public Pol’y* 441 (2017).

¹⁰⁰ Interagency Working Group 2010, 19.

¹⁰¹ *Id.*

¹⁰² *Id.* at 23.

¹⁰³ Richard Newell and William Pizer, *Discounting the distant future: how much do uncertain rates increase valuations?* 46 *Journal of Env. Ec. and Management* 52 (2003).

¹⁰⁴ Interagency Working Group 2010, 23.

¹⁰⁵ Technical Support Document : Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (Aug. 2016), 17, https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf

¹⁰⁶ Interagency Working Group 2010, 10–11.

In 2016, the IWG offered more details.¹⁰⁷ It observed that under OMB Circular A-4,¹⁰⁸ “analysis of economically significant proposed and final regulations from the domestic perspective is required, while analysis from the international perspective is optional.” At the same time, it concluded “that a modified approach is more appropriate in this case.” To defend that conclusion, it made several points. Climate change “involves a global externality: emissions of most greenhouse gases contribute to damages around the world even when they are emitted in the United States—and conversely, greenhouse gases emitted elsewhere contribute to damages in the United States.”¹⁰⁹ It follows that climate change is a problem “that the United States alone cannot solve. Other countries will also need to take action to reduce emissions if significant changes in the global climate are to be avoided. . . . Using a global estimate of damages in U.S. regulatory analyses sends a strong signal to other nations that they too should base their emissions reductions strategies on a global perspective, thus supporting a cooperative and mutually beneficial approach to achieving needed reduction.”¹¹⁰

In addition, the adverse impacts of climate change “on other countries can have spillover effects on the United States, particularly in the areas of national security, international trade, public health, and humanitarian concerns.”¹¹¹ In particular,

The global nature of GHGs means that U.S. interests, and therefore the benefits to the U.S. population of GHG mitigation, cannot be defined solely by the climate impacts that occur within U.S. borders. Impacts that occur outside U.S. borders as a result of U.S. actions can directly and indirectly affect the welfare of U.S. citizens and residents through a multitude of pathways. Over 9 million U.S. citizens lived abroad as of 2016¹⁷ and U.S. direct investment positions abroad totaled nearly \$6 trillion in 2019. Climate impacts occurring outside of U.S. borders will have a direct impact on these U.S. citizens and the investment returns on those assets owned by U.S. citizens and residents. The U.S. economy is also inextricably linked to the rest of the world. The U.S. exports over \$2 trillion worth of goods and services a year and imports around \$3 trillion. Climate impacts that occur outside U.S. borders can thus impact the welfare of individuals and firms that reside in the United States through their effect on international markets, trade, tourism, and other activities. Furthermore, additional spillovers can occur through pathways such as economic and political destabilization and global migration that can lead to adverse impacts on U.S. national security, public health, and humanitarian concerns.

The IWG also made a technical point. As “an empirical matter, the development of a domestic SC-GHG is greatly complicated by the relatively few region- or country-specific estimates of the SC-CO₂ in the literature”; existing estimates are incomplete. Finally, and importantly, the problem of climate change is a prisoner’s dilemma: If every nation used a

¹⁰⁷ Technical Support Document : Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (Aug. 2016), 17, https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf

¹⁰⁸ See Circular A-4, Regulatory Analysis, 68 Fed. Reg. 58366 (2003), available at <https://www.federalregister.gov/documents/2003/10/09/03-25606/circular-a-4-regulatory-analysis>.

¹⁰⁹ Id.

¹¹⁰ Id.

¹¹¹ Id.

domestic cost of carbon, every nation would be hurt.¹¹² This is “the issue of reciprocity.” It follows that the “only way to achieve an efficient allocation of resources for emissions reduction on a global basis is for all countries to base their policies on global estimates of damages.”

From the beginning, the IWG offered a number of cautionary notes about the limitations of its analysis, including incompleteness with respect to non-catastrophic harm, a possible failure to account for catastrophic harm, risk neutrality, and controversial claims about adaptation.¹¹³ The numbers produced by the IWG played a significant role in the design of many regulations,¹¹⁴ though it is not entirely clear to what extent they drove particular judgments about stringency.

B. The Social Cost of Carbon, 2017-2021

In 2017, President Donald Trump issued an Executive Order that explicitly addressed the social cost of carbon.¹¹⁵ The order rescinded essentially all relevant documents from the Obama administration and stated:

Effective immediately, when monetizing the value of changes in greenhouse gas emissions resulting from regulations, including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates, agencies shall ensure, to the extent permitted by law, that any such estimates are consistent with the guidance contained in OMB Circular A-4 of September 17, 2003 (Regulatory Analysis), which was issued after peer review and public comment and has been widely accepted for more than a decade as embodying the best practices for conducting regulatory cost-benefit analysis.

This provision was widely understood to call for two changes to the Obama administration’s practices.¹¹⁶ First, agencies would be expected to use the domestic measure rather than the global measure. Second, agencies would be expected to calculate the benefits of reducing greenhouse gas emissions with discount rates of 3% and 7%, consistent with OMB Circular A-4. In regulations from the Trump administration, the social cost of carbon generally ranged from \$1 to \$7.¹¹⁷

C. The Return of the Repressed: 2021

¹¹² See Matthew J. Kotchen, *Which Social Cost of Carbon? A Theoretical Perspective*, 5 J. of the Ass’n of Env. and Resource Ec. 673 (2018), available at <https://environment.yale.edu/kotchen/pubs/whichscc.pdf>

¹¹³ IWG, *supra* note 87, at 5, 30-33.

¹¹⁴ See Carleton and Greenstone, *supra* note 87; Masur and Posner, *supra* note 19.

¹¹⁵ Promoting Energy Independence and Economic Growth, 82 Fed. Reg. 16093 (2017). Available at <https://www.federalregister.gov/documents/2017/03/31/2017-06576/promoting-energy-independence-and-economic-growth>

¹¹⁶ Dana Nuccitelli, “The Trump EPA is vastly underestimating the cost of carbon dioxide pollution to society, new research finds,” Yale Climate Connections (July 30, 2020), <https://yaleclimateconnections.org/2020/07/trump-epa-vastly-underestimating-the-cost-of-carbon-dioxide-pollution-to-society-new-research-finds/>

¹¹⁷ Tamma Carleton and Michael Greenstone, UPDATING THE UNITED STATES GOVERNMENT’S SOCIAL COST OF CARBON 3-5 (2021), available at <http://www.impactlab.org/research/updating-the-united-states-governments-social-cost-of-carbon/>.

On his first day in office, President Joe Biden issued an Executive Order that, among other things, explicitly addressed the social cost of carbon emissions.¹¹⁸ The relevant provision began simply: “It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account.” This was a clear direction to use the global rather than the domestic measure. The order added that taking those steps “facilitates sound decision-making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues.” It also established an Interagency Working Group, led by the Council of Economic Advisers, the Director of OMB, and the Director of the Office of Science and Technology Policy. The Working Group was directed to produce an interim “social cost of carbon” (SCC), “social cost of nitrous oxide” (SCN), and “social cost of methane” (SCM) within 30 days. It was also directed to “publish a final SCC, SCN, and SCM by no later than January 2022.”

Importantly, the Order added this:

In carrying out its activities, the Working Group shall consider the recommendations of the National Academies of Science, Engineering, and Medicine as reported in *Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide* (2017) and other pertinent scientific literature; solicit public comment; engage with the public and stakeholders; seek the advice of ethics experts; and ensure that the SCC, SCN, and SCM reflect the interests of future generations in avoiding threats posed by climate change.

The Working Group’s interim social cost of carbon adopted much of the analysis and approach of the Obama administration, at least for that interim use.¹¹⁹ At the same time, it offered significant discussion of relevant issues, including the discount rate and the choice between the global and domestic measures.¹²⁰ It strongly signaled, for example, that the appropriate discount rate might be under 3%, though it chose to use that number for purposes of the interim value, stating that the consumption rate of interest is the appropriate foundation for regulatory impact new analysis.¹²¹ But pointing to new evidence on the consumption discount rate, it said, “the IWG finds it appropriate as an interim recommendation that agencies may consider conducting additional sensitivity analysis using discount rates below 2.5%.”¹²² It also suggested the importance of taking account of the recommendations of the National Academies of Sciences.¹²³ With respect to the use of the global measure, it said this¹²⁴:

Unlike many environmental problems where the causes and impacts are distributed more locally, climate change is a true global challenge making GHG emissions a global

¹¹⁸ Exec. Order No. 13990, 86 Fed. Reg. 7037 (2021), <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/>.

¹¹⁹ Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990 (Feb. 2021), https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

¹²⁰ Id. at 17.

¹²¹ Id. at 19.

¹²² Id. at 21.

¹²³ Id. at 12 – 13.

¹²⁴ Id. at 15 – 16.

externality. GHG emissions contribute to damages around the world regardless of where they are emitted. The global nature of GHGs means that U.S. interests, and therefore the benefits to the U.S. population of GHG mitigation, cannot be defined solely by the climate impacts that occur within U.S. borders. Impacts that occur outside U.S. borders as a result of U.S. actions can directly and indirectly affect the welfare of U.S. citizens and residents through a multitude of pathways. Over 9 million U.S. citizens lived abroad as of 2016 and U.S. direct investment positions abroad totaled nearly \$6 trillion in 2019. Climate impacts occurring outside of U.S. borders will have a direct impact on these U.S. citizens and the investment returns on those assets owned by U.S. citizens and residents. The U.S. economy is also inextricably linked to the rest of the world. . . . The global nature of GHGs means that damages caused by a ton of emissions in the U.S. are felt globally and that a ton emitted in any other country harms those in the U.S. Therefore, assessing the benefits of U.S. GHG mitigation activities will require consideration of how those actions may affect mitigation activities by other countries since those international actions will provide a benefit to U.S. citizens and residents.

III. The Social Cost of Carbon in Court

The social cost of carbon has been challenged in two cases. The first occurred during the Obama administration, and the second during the Trump administration. The first decision seemed to apply a (very) soft look, something like what Judge Bazelon sought on the merits and akin to that suggested in *Baltimore Gas*; the second applied a hard look, both procedural and substantive and akin to that suggested in *State Farm*.

In *Zero Zone v. Department of Energy*,¹²⁵ a small business mounted a series of challenges to energy efficiency standards for refrigerator equipment. One of the challenges involved the social cost of carbon. The plaintiffs urged, very broadly, that DOE was forbidden from considering environmental factors and in the alternative that DOE's use analysis of the social cost of carbon was arbitrary and capricious. The court briefly referred to several objections, including the claim that the damage function (taken up below¹²⁶) "was determined in an arbitrary manner."¹²⁷ The court rejected the objections summarily, simply noting that the agency had responded to them in the rulemaking.¹²⁸ This was a very soft look – in my view, too soft, though the conclusion was correct. (Abdication, no.)

In 2020, by contrast, a district court in *California v. Bernhardt*¹²⁹ struck down a rule from the Bureau of Land Management (BLM), called the Waste Prevention Rule, whose content had been materially affected by the BLM's social cost of methane. In 2016, the BLM had relied on the analysis of the IWG in the Obama Administration, which supported a conclusion that the total benefits of emissions reductions from the rule would range between \$1.6 and \$1.9 billion. Under the Trump Administration, the benefits numbers fell to range between \$66 to \$259

¹²⁵ *Zero Zone v. Department of Energy*, 832 F.3d 654 (7th Cir. 2016).

¹²⁶ See *infra* Part IV.F.

¹²⁷ *Id.* at 678.

¹²⁸ *Id.* at 689 – 690.

¹²⁹ *California v. Bernhardt*, 472 F. Supp. 3d 573 (N.D. Cal. 2020).

million. To generate the new numbers, the BLM relied on what it called an “interim domestic” model, focusing only on the benefits of emissions reductions to those living in the United States. The court held that the agency’s decision was arbitrary. It ruled, first, that the agency could not defend its decision by reference to a relevant Executive Order. That order “did not and could not erase the scientific and economic facts that formed the basis for” the earlier estimate.¹³⁰ No president can “alter by fiat what constitutes the best available science.” This is an important conclusion, and a version of the procedural hard look. It suggests that if an agency is following an Executive Order, it is not immune from arbitrariness review. The question remains whether the agency is able to point, somewhere, to a rational justification for its choices.

In the court’s view, the fact that BLM is “the expert agency,” not limited to peer-reviewed science, was not sufficient. First, “the social cost of methane is beyond BLM’s expertise.”¹³¹ Second, and more relevantly, the “interim domestic” model “is riddled with flaws.”¹³² In offering this conclusion, the court undertook a substantive rather than procedural hard look, and it referred to several of the arguments made by the IWG in 2016. For example, the agency’s estimate neglected the effects of greenhouse gas emissions on eight million U.S. citizens living abroad, and also on thousands of United States military personnel; on billions of dollars of physical assets owned by United States companies abroad; on United States companies affected by their trading partners and suppliers abroad; and on global migration and geopolitical security. The agency’s failure to show “a rational connection between the best available science” and its estimate meant that its decision was arbitrary on the merits.¹³³ The court added that economists and scientists alike rejected the idea of focusing solely on the domestic effects.¹³⁴ One reason was the difficulty of offering an estimate of those effects in light of the limits of existing science.¹³⁵ Another reason was the spillover effects, on the United States itself, of the international effects.¹³⁶

Here, then, is the substantive hard look in action. We can read *California v. Bernhardt* to have drawn attention to failures of both deliberation and democracy. The failures of deliberation involve inadequate reason-giving, including inadequate attention to counterarguments. The failures of democracy consist of inadequate engagement, in public, with the competing considerations. In a sense, the decision of the BLM can be seen as authoritarian – an edict and a conclusion unsupported by a public justification.

IV. Choices

To produce a social cost of carbon, officials are required to answer an assortment of questions. I focus on the most important of those questions here. My focus throughout is on arbitrariness review and both the procedural and the substantive hard look. It is possible, of

¹³⁰ Id. at 611.

¹³¹ Id. at 613.

¹³² Id.

¹³³ Id. at 608.

¹³⁴ See id. at 613.

¹³⁵ Id.

¹³⁶ Id.

course, that some substantive statute constrains any agency's choices, in which case the analysis would be undertaken under the framework established by *Chevron*.¹³⁷

Of course it is true that scope of review issues are to be resolved by Congress, not by courts. If arbitrariness review, in the APA, meant something very concrete and specific, courts would be bound to follow it. But (again) the terms "arbitrary" and "capricious" are best treated as concepts, not conceptions,¹³⁸ even if they are understood by reference to the original meaning in 1946.¹³⁹ They have to be specified by judges. The question is the best specification.¹⁴⁰ The simple judgments here are that (1) courts are most likely to prevent error, and to provide a valuable check, if they impose a procedural hard look and (2) courts are least likely to prevent error, and most likely to be blunder, if they make their own judgments about the merits, at least on highly technical issues, or issues in which political judgments play a legitimate role. Proposition (2) does not deny the self-evident fact that arbitrary decisions are unlawful, but it asserts that in the face of difficult questions of science and economics, agencies are usually entitled to enjoy a large "zone" of reasonableness.

A. Domestic or Global

It is obvious that if an agency simply chose the global measure without explaining itself, it would be acting arbitrarily, and the same is true if it simply chose the domestic measure without offering some kind of justification. As *California v. Bernhardt* shows, an agency would not be much better off if it simply referred to an Executive Order or to OMB guidance – unless, perhaps, it incorporated by reference the justifications that were provided in any such document. "Following orders," as such, is not a sufficient response to a claim of arbitrariness, even if an agency is obliged to follow orders.¹⁴¹ Under the procedural hard look, the orders must not themselves be arbitrary. Suppose, for example, that an Executive Order called for a social cost of carbon of \$0.50, or of \$10,000. An agency that followed such a presidential directive could not escape invalidation for arbitrariness (unless it could defend one or another number, which would be exceedingly difficult to do).

Choice of the global number should be straightforward to defend against an arbitrariness challenge. First, it would certainly not be arbitrary to say that control of greenhouse gases requires nations to solve a collective action problem; that use of the domestic number by every nation would harm citizens in all nations, including the United States; and that use of the global number by the United States is meant as a way to promote use of that number by other nations,

¹³⁷ *Chevron v. NRDC*, 467 U.S. 837 (1984)

¹³⁸ See John Rawls, *A THEORY OF JUSTICE* 9 (1971).

¹³⁹ See *supra* Part II.

¹⁴⁰ This view is broadly consistent with that in Ronald Dworkin, *LAW'S EMPIRE* (1985) and Sunstein and Vermeule, *supra* note 57.

¹⁴¹ There are some complexities here. A presidential directive might, at the very least, have a psychological effect on reviewing courts. And insofar as there is a concern about policy decisions by "unaccountable bureaucrats," a presidential directive might seem relevant. The only point is that such a direct is not a sufficient response, standing by itself, to an arbitrariness challenge.

and thus to help citizens in the United States.¹⁴² Second, it would not be arbitrary for an agency to say that on ethical grounds, it believes that harms to people outside of the United States ought to count in its assessment.¹⁴³ That is hardly an arbitrary judgment about what morality requires.¹⁴⁴ If an agency is making that judgment, by the way, it should be transparent about it, insofar as it is using an account (a cosmopolitan one) that is not accepted by all.

To be sure, some of the articulated grounds for using a global figure stand on weaker grounds. It is not clear that it would be sufficient, against an arbitrariness challenge, to say that specification of the domestic number is difficult. Even if that is so, some fraction of the global number would seem preferable to the global number itself, even if the fraction could not be specified, and even if any number could be disputed. Nor would it be sufficient, to defend the global number, to say that U.S. citizens (and interests) can be found outside the United States. That proposition would support what might be termed an “inclusive domestic number,” including all harms to U.S. citizens (and interests). But again, that point would justify some number in excess of an unduly narrow domestic number, but not the global number itself, which would necessarily be far higher than the number that would capture harms done to U.S. citizens (and interests).

Could use of the domestic number be defended against an arbitrariness challenge? Could an administration give a reasoned explanation for that choice, sufficient to survive invalidation under the procedural and substantive hard look? To avoid arbitrariness, an agency might begin by insisting that it is adopting an inclusive domestic number, that it is not limiting its number to harms done to U.S. citizens within the territory of the United States from emissions within the territory of the United States, and that its “domestic” number includes harms done to U.S. citizens (and interests) outside to the United States, and also harms done to U.S. citizens (and interests) as a direct result of the effects of U.S. emissions on those in other nations. An approach of this kind would permit an agency to avoid some of the objections in *California v. Bernhardt*.

Would it be arbitrary for an agency to *decline to consider the harms done to noncitizens outside of the United States*? Such a decision would run into some large theoretical questions, and there is a plausible argument that an agency could non-arbitrarily take either side.¹⁴⁵ It could begin by insisting, for example, that the job of public officials is to protect of those whom they are elected to represent, and that the job of U.S. officials is to protect U.S. citizens.¹⁴⁶ (That view may or may not be accompanied by the belief (or hope?) that if all officials, in all nations, see their jobs in parallel terms, all will be better off.¹⁴⁷) To that point, an agency might add that the

¹⁴² Matthew J. Kotchen, *Which Social Cost of Carbon? A Theoretical Perspective*, 5 J. of the Ass’n of Env. and Resource Ec. 673 (2018).

¹⁴³ Kian Mintz-Woo, *Two Moral Arguments for a Global Social Cost of Carbon*, 21 Ethics, Policy and Environment 60 (2018). Recall that my focus is on arbitrariness review; there might be a separate question whether a judgment of this kind would be consistent with the underlying statute.

¹⁴⁴ See Arden Rowell and Lesley Wexler, *Valuing Foreign Lives*, 48 Ga. L. Rev. 499 (2014), available at https://privpapers.ssrn.com/sol3/papers.cfm?abstract_id=2240564

¹⁴⁵ See Ted Gayer and W. Kip Viscusi, *Determining the Proper Scope of Climate Change Policy Benefits in U.S. Regulatory Analyses*, Review of Environmental Economics and Policy (2016), available at <https://www.brookings.edu/wp-content/uploads/2016/08/rev-environ-econ-policy-2016-gayer-reep-rew002.pdf>

¹⁴⁶ Jack Goldsmith, *Liberal Democracy and Cosmopolitan Duty*, 55 Stan. L. Rev. 1667 (2003).

¹⁴⁷ Simon Caney, JUSTICE BEYOND BORDERS: A GLOBAL POLITICAL THEORY 3–16 (2005);

climate change problem requires complex international negotiations, and use of the domestic figure, at a certain time, is an opening bid in those negotiations – with the global figure perhaps to follow if the negotiation proceeds in the right way. (Note that this argument would, in a way, be a sibling to that offered by the Obama administration in defense of the global number.) In brief: An agency might reasonably choose the *global* number as a way of promoting international negotiations that would ultimately be in the interest of U.S. citizens. So too, perhaps, an agency might reasonably choose the *domestic* number for the same reason. On one view, the only question is one of appropriate strategy – of what is more effective in international negotiations. No court is likely to claim to have competence on that question.

A potential difficulty with any argument of this kind, signaled by *Massachusetts v. EPA*,¹⁴⁸ is that the relevant agency (for example, the Bureau of Land Management, the Environmental Protection Agency, or the Department of Energy) might not have the lead in international negotiations, or even play a significant role. As the Court stated¹⁴⁹:

In the Global Climate Protection Act of 1987, Congress authorized the State Department—not EPA—to formulate United States foreign policy with reference to environmental matters relating to climate. EPA has made no showing that it issued the ruling in question here after consultation with the State Department. Congress did direct EPA to consult with other agencies in the formulation of its policies and rules, but the State Department is absent from that list.

Under almost all imaginable circumstances, the general thrust of this argument is naive. Agencies are in frequent communication with each other, not only and not least through the process of review overseen by the Office of Information and Regulatory Affairs (OIRA).¹⁵⁰ One of OIRA’s jobs is to circulate draft rules for interagency comments, and it would be shocking if the Department of State, the United States Trade Representative, and others involved in international negotiations did not receive, or have an opportunity to comment on, a draft rule from EPA on climate change issues. For an issue as important as the social cost of carbon, those involved in international negotiations would almost certainly be informed and be in some important sense involved. As we have seen, both the Obama administration and the Biden administration created interagency working groups, consisting of a large number of agencies and departments. I can report from experience, in the Obama administration, that those of us who were involved in the process for producing a social cost of carbon engaged with officials in agencies and departments that were not a formal part of that process (including those in charge of international negotiations).

Jack Goldsmith, *Liberal Democracy and Cosmopolitan Duty*, 55 *Stan. L. Rev.* 1667, 1670 – 1671 (2003); Judith Lichtenberg, *National Boundaries and Moral Boundaries: A Cosmopolitan View*, in *BOUNDARIES: NATIONAL AUTONOMY AND ITS LIMITS* 79 (Peter G. Brown & Henry Shue eds., 1981). On cosmopolitanism and the social cost of carbon, see Masur and Posner, *supra* note 19, at 1593-1596.

¹⁴⁸ *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007).

¹⁴⁹ *Id.* at 534.

¹⁵⁰ See Cass R. Sunstein, *The Office of Information and Regulatory Affairs: Myths and Realities*, 126 *Harv. L. Rev.* 1838 (2013).

For defenders of the use of the domestic figure, the hardest argument to meet involves the prisoner's dilemma: if every nation used the domestic figure, U.S. citizens would lose.¹⁵¹ Why, then, is it not arbitrary to use a figure that is likely to produce such losses? A failure to answer that question would be arbitrary. Perhaps it could be doubted that if the U.S. is in a prisoner's dilemma, it is arbitrary for the U.S. to defect; after all, the point of the dilemma is that (all else equal) that is the dominant strategy. A more attractive answer, signaled above, does not contest the premise and insists that the (initial) use of a domestic figure is (merely) part of a negotiating process, in which the U.S. might hold out the global figure as a kind of carrot by which to lead other nations to do the same. The conclusion is that while use of the global figure is straightforward to defend against an arbitrariness challenge, use of the domestic figure is more challenging to defend – more challenging but not impossible, if a properly articulated justification were offered.

B. The Discount Rate

It is an understatement to say that for climate change, debates over the appropriate discount rate are exceptionally complicated; they raise difficult questions in economics, political philosophy, and law.¹⁵² Broadly speaking, there are three reasons to “discount” future benefits or costs.¹⁵³ The first is that money today can be invested and made to grow. For that reason alone, it is better to receive \$1,000 today than to receive \$1,000 in ten years. In the words of OMB Circular A-4, “Resources that are invested will normally earn a positive return, so current consumption is more expensive than future consumption, since you are giving up that expected return on investment when you consume today.”¹⁵⁴ Importantly, we are speaking here of discounting future *money*, not of discounting future *welfare*.

The second is the “pure rate of time preference.” Many people value the present over the future, and would prefer receiving \$1,000 today to receiving the economic equivalent of \$1,000 today in ten years. Importantly, we are speaking here of discounting future welfare, not merely future money: People might prefer to have a good day tomorrow to having a good day in ten years. As Circular A-4 puts it, “Postponed benefits also have a cost because people generally prefer present to future consumption.”¹⁵⁵ It is true that any such preference might reflect “present bias,” a form of bounded rationality.¹⁵⁶ But a pure rate of time preference need not be a departure from perfect rationality. It could, for example, reflect an understanding that one might die in the meantime.

¹⁵¹ Matthew J. Kotchen, *Which Social Cost of Carbon? A Theoretical Perspective*, 5 J. of the Ass'n of Env. and Resource Ec. 673 (2018).

¹⁵² See William D. Nordhaus, *A Review of the Stern Review on the Economics of Climate Change*, 45 J. Econ. Lit. 686 (2007); Lawrence H. Golder and Robertson C. Williams III, *The Choice of Discount Rate for Climate Change Evaluation* (2012), available at https://www.nber.org/system/files/working_papers/w18301/w18301.pdf; David A. Weisbach & Cass R. Sunstein, *Climate Change and Discounting the Future: A Guide for the Perplexed*, 27 Yale L. & Pol'y Rev. (2008); Kenneth J. Arrow et al., *Should Governments Use A Declining Discount Rate in Project Analysis?*, 8 Review of Environmental Analysis and Pol'y 145 (2014).

¹⁵³ See Carleton and Greenstone, *supra* note 18; Weisbach and Sunstein, *supra* note 98.

¹⁵⁴ See OMB Circular A-4 (2003), *supra* note 108.

¹⁵⁵ *Id.*

¹⁵⁶ Ted O'Donoghue and Matthew Rabin, *Present Bias: Lessons Learned and To Be Learned*, 105 Am. Econ. Rev. 273 (2015).

Still, there are serious ethical issues, discussed below, about use of a pure rate of time preference in the intergenerational context.¹⁵⁷ It is one thing to say that John Jones cares more about his welfare in the next year than his welfare in some year in the very distant future. It is another thing altogether to say that the current generation cares more about its own welfare than it does about the welfare of some future generation. What moral standing do the desires of the current generation have, when it comes to the weight to be given welfare of those who will follow? There is a good argument that they have no standing, which means that the pure rate of time preference is largely irrelevant to the climate change problem. (This is a controversial conclusion.)

The third point is that people are likely to be richer over time; that a given amount of money is worth more to relatively poorer people than to relatively wealthier people; and that some kind of discount rate is justified to take account of the fact that future people will be wealthier than present people. Here we are speaking of discounting money, rather than welfare, and simply suggesting that if history is any guide, people are likely to be richer in a hundred years than they are today. In the words of OMB Circular A-4: "If consumption continues to increase over time, as it has for most of U.S. history, an increment of consumption will be less valuable in the future than it would be today, because the principle of diminishing marginal utility implies that as total consumption increases, the value of a marginal unit of consumption tends to decline."¹⁵⁸ This reason for discounting money is controversial insofar as it is believed that (for example) the threat of climate change might mean that people will not be richer in the future.

Under current OMB guidance, originally issued in 2003, federal agencies are instructed to use discount rates of 3 percent and 7 percent in cost-benefit analysis.¹⁵⁹ The main reason for discounting, under that guidance, is the first: money can be invested and made to grow. On this count, Circular A-4 is worth quoting at length¹⁶⁰:

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 is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital. 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." This simply means the rate at which "society" discounts future consumption flows to their present value. 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

¹⁵⁷ See, e.g., J. Paul Kelleher, *Pure Time Preference in Intertemporal Welfare Economics*, 33 *Economics and Philosophy* 441 (2017).

¹⁵⁸ OMB Circular A-4, *supra* note 108, at 32.

¹⁵⁹ *Id.* at 33.

¹⁶⁰ *Id.*

government debt may provide a fair approximation. . . . For regulatory analysis, you should provide estimates of net benefits using both 3 percent and 7 percent.

Importantly, the two numbers come from market rates of return. The 7 percent rate is meant to reflect real equity returns (as, for example, in the stock market). The 3 percent rate is meant to capture the risk-free rate of return (as, for example, from U.S. government bonds). In 2003, these numbers were certainly reasonable and would have easily survived arbitrariness review. But (and this is the key point) at the current time, it is exceedingly difficult to defend the idea that 3 percent reflects the risk-free rate of return.¹⁶¹ In 2017, the Council of Economic Advisers suggested that in light of declines in real interest rates, 2 percent would be preferable.¹⁶² Simply as a technical matter, it is very hard to come up with a non-arbitrary explanation of use of a discount rate of 7 percent, and 2 percent or perhaps lower fits well with existing market conditions.¹⁶³

Here as elsewhere, a procedural hard look would require agencies to offer a detailed (and reasonable) discussion of their choices and to discuss objections (reasonably). A substantive hard look would put certain choices in serious jeopardy. Under current conditions, for example, use of a 7 percent figure would be exceedingly difficult to defend. By contrast, use of a 2 percent discount rate would be exceedingly straightforward to defend. Use of a 3 percent discount rate would face a real challenge in light of the weight of the existing evidence.¹⁶⁴ Declining discount rates, over long period of time, also make a great deal of sense.¹⁶⁵ But these are highly technical issues, and courts are likely to be deferential to substantive choices, so long as they are adequately explained and not plainly inconsistent with the evidence.¹⁶⁶

C. Equity

It is understatement to say that climate change raises an assortment of serious ethical issues.¹⁶⁷ Should wealthy countries bear the burden of measures designed to promote mitigation, resilience, and adaptation? If climate change will impose especially serious harms on identifiable areas, and on identifiable groups of people, is there an ethical obligation to devote particular attention to those areas and those people? If so, what are the concrete implications for policy?

The social cost of carbon raises ethical issues of multiple different kinds.¹⁶⁸ It is standard to adopt a utilitarian social welfare function, purporting to treat everyone the same. Doing that has

¹⁶¹ See Council of Economic Advisers, Issue Brief, Discounting for Public Policy (2017), available at https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf; Carleton and Greenstone, *supra* note 19.

¹⁶² See Council of Economic Advisers, *supra* note 161.

¹⁶³ See Carleton and Greenstone, *supra* note 19.

¹⁶⁴ See *id.*

¹⁶⁵ See Arrow et al., *supra* note 152.

¹⁶⁶ For a dated but still valuable analysis, see Edward Morrison, *Judicial Review of Discount Rates Used in Regulatory Cost-Benefit Analysis*, 65 U. Chi. L. Rev. 1333 (1998).

¹⁶⁷ STEPHEN GARDINER, *A PERFECT MORAL STORM* (2011); ERIC A. POSNER AND DAVID A. WEISBACH, *CLIMATE CHANGE JUSTICE* (2010); Kian Mintz-Woo, *Two Moral Arguments for a Global Social Cost of Carbon*, 21 *Ethics, Policy and Environment* 60 (2018)

¹⁶⁸ See Matthew D. Adler et al., *Priority for the Worse-Off and the Social Cost of Carbon*, 7 *Nature Climate Change* 6 (2016); Matthew D. Adler, *Future Generations: A Prioritarian View*, 77 *Geo. Wash. L. Rev.* 1478 (2009).

evident moral justifications. But from the standpoint of equity, we might nonetheless make several objections to existing approaches that purport to have utilitarian foundations. As we have seen, the first, operating within a purely utilitarian framework, involves a pure time preference. Why should people born in 2040 be valued less than people born in 2020? There is no good answer to that question.

The second objection also operates within a purely utilitarian framework: A poor person gains more from a given unit of money more than a rich person does. If you are poor, \$500 might mean a great deal; the same is not true if you are a billionaire. If we focus on welfare, we might want to give “equity weights” to people who are poor – perhaps people in poor regions in the United States, perhaps people in poor nations. If the reason is the declining marginal value of consumption, agencies might build on empirical findings to specify those weights.¹⁶⁹ The specification could help determine the social cost of carbon.¹⁷⁰ It might seem intuitive that the use of equity weights would produce a higher social cost of carbon, but perhaps surprisingly, a prominent model finds that the social cost of carbon is higher *without* equity weights.¹⁷¹ Whatever the consequence of equity weights, it might seem very reasonable to use them, given the fact that a given unit of money gives more welfare to the poor than to the wealthy.

Outside of a purely utilitarian framework: “Prioritarianism” suggests that we should devote special attention to the welfare of those who are least well-off.¹⁷² Imagine that the world consists of two people, Mary and Edna. Mary has 100 units of welfare; Edna has 1 unit of welfare. If we choose Intervention A, both will gain 20 units of welfare, so that Mary will have 120, and Edna will have 21. If we choose Intervention B, Mary will gain 10 units of welfare and Edna will gain 28, so that Mary will have 110, and Edna will have 29. Intervention A results in more aggregate welfare (141 is larger than 139), but there is an argument in favor of choosing Intervention B, not (on prioritarian grounds) because it results in a more *equal* distribution, but because it *gives more help to the person at the bottom*. As for individuals, so for groups: We might give priority to those whose welfare is lowest and sacrifice aggregate welfare in order to achieve that goal. But how much should we sacrifice? The answer must depend on the right specification of prioritarianism. A situation in which Mary has 120 and Edna has 5 might be better than one in which Mary has 50 and Edna has 6 (or not).

If prioritarianism is accepted, it has important implications for the social cost of carbon,¹⁷³ and in two different ways. The first is generational: *Which generation is the least well off?* The second is demographic: *Which groups, at the relevant times, are least well off?* With respect to the social cost of carbon, the answers to the two questions might lead us in different directions. On plausible assumptions, future generations will be better off than the current generation, which would lead to a preference for the latter, which would lead to a lower social cost of carbon. But the most disadvantaged groups, past and present, are likely to be at particular

¹⁶⁹ See Carleton and Greenstone, *supra* note 19.

¹⁷⁰ See Chris Hope, *Discount Rates, Equity Weights, and the Social Cost of Carbon*, 30 *Energy Economics* 1011 (2008).

¹⁷¹ *Id.* at 1011-1013.

¹⁷² See PRIORITARIANISM IN PRACTICE (Matthew D. Adler ed., forthcoming 2022); Matthew D. Adler and Nils Holtug, *Prioritarianism: A Response to Critics*, 18 *Politics, Philosophy & Economics* 101 (2019).

¹⁷³ See Adler, PRIORITARIANISM IN PRACTICE, *supra* note 172.

risk from climate change, which could lead to a higher social cost of carbon. It should be clear that there are complex technical as well as normative issues here.¹⁷⁴

With these considerations in mind, agencies could handle the question of equity in many different ways. The various considerations could be mixed and matched, resulting in diverse combinations. Here is a non-exhaustive list:

1. Agencies could decide in favor of a utilitarian social welfare function, with a discount rate that includes a pure rate of time preference.
2. Agencies could decide in favor of a utilitarian social welfare function, with a discount rate that does not include a pure rate of time preference.
3. Agencies could decide in favor of a utilitarian social welfare function, with a discount rate that includes a pure rate of time preference, but also with equity weights.
4. Agencies could decide in favor of a utilitarian social welfare function, with a discount rate that does not include a pure rate of time preference, but that does include equity weights.
5. Agencies could decide in favor of a prioritarian social welfare function, with a discount rate that includes a pure rate of time preference, but that also gives special weight to present generations, on the ground that they are likely to be poorer.
6. Agencies could decide in favor of a prioritarian social welfare function, with a discount rate that does not include a pure rate of time preference, but that also gives special weight to present generations, on the ground that they are likely to be poorer.
7. Agencies could decide in favor of a prioritarian social welfare function, with a discount rate that does not include a pure rate of time preference, but that also gives weight to poorer nations at relevant periods of time.

A great deal of work would be required to specify each of these options. Let us simply note that as a matter of principle, it is not at all clear which is best. What is clear is that in terms of arbitrariness review, courts would and should tread very lightly indeed. A utilitarian social welfare function is conventional, and it would not be arbitrary to choose it, so long as it is defended. Equity weights should be rejected or selected, so long as an explanation was offered for the choice. Prioritarianism has strong defenders¹⁷⁵ and strong critics, and it would not be arbitrary to choose it, so long as the approach is explained and defended. This is a domain for a procedural hard look, but not a substantive one.

D. The IAMs

As we have seen, the Obama, Trump, and Biden Administrations have grounded their numbers in three leading IAMs.¹⁷⁶ Is that arbitrary? An initial and relatively modest objection would be that if agencies should use the IAMs, they should use the most recent ones, rather than those from a decade ago (or more).¹⁷⁷ For example, Nordhaus' DICE model has been continually

¹⁷⁴ See Matthew D. Adler et al., *Priority for the Worse-Off and the Social Cost of Carbon*, 7 *Nature Climate Change* 6 (2016).

¹⁷⁵ See *id.*; PRIORITARIANISM IN PRACTICE, *supra* note 172.

¹⁷⁶ See *supra* Part III.A.

¹⁷⁷ See Carleton and Greenstone, *supra* note 19.

updated, with an extensive revision in 2017, producing different numbers.¹⁷⁸ It would not be easy to defend the use of old models that have been updated by their own authors. Everyone agrees that there is continuing work on the likely damage from climate change, with bands of uncertainty; a social cost of carbon should draw on what is best and most recent.¹⁷⁹

A more fundamental objection would build on one or more of an assortment of claims from distinguished critics. Robert Pindyck, for example, urges that the “models are so deeply flawed as to be close to useless as tools for policy analysis.”¹⁸⁰ In his view, “the models’ descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation,” and “the models can tell us nothing about the most important driver of the SCC, the possibility of a catastrophic climate outcome.”¹⁸¹ Similarly, Masur and Posner urge that “[t]he three major economic models on which agencies rely are extraordinarily crude. The cost of climate change will be high, but it is not clear how high, and one cannot conduct cost-benefit analysis of a regulation without knowing what its economic effect will be.”¹⁸²

Pindyck draws special attention to areas “where the uncertainties are greatest and our knowledge is weakest”¹⁸³: climate sensitivity and the damage function. I will take these up more specifically below, but with respect to climate sensitivity, Pindyck suggests that we know very little, because “the physical mechanisms that determine climate sensitivity involve crucial feedback loops, and the parameter values that determine the strength (and even the sign) of those feedback loops are largely unknown, and for the foreseeable future may even be unknowable.”¹⁸⁴ With respect to the damage function, he urges that “we know almost nothing,” which means that the developers of IAMs “can do little more than make up functional forms and corresponding parameter values.”¹⁸⁵ Losses for individual regions, for agriculture, and for forestry are built on assumptions rather than data, and some of those assumptions are ad hoc.¹⁸⁶ Hence Pindyck’s conclusion that “the damage functions used in most IAMs are completely made up, with no theoretical and empirical foundation.”¹⁸⁷ In any case, the IAMs do not say much about catastrophic outcomes, which is a quite serious gap.¹⁸⁸ Pindyck’s conclusion is that we cannot reliably use the IAMs to establish a social cost of carbon, though we might explore plausible scenarios and make policy accordingly.¹⁸⁹

These and other objections might lead an agency not to rely on one or more of the three IAMs invoked from 2009 to the present, but to rely on some other model in whole or in part. For example, the FAIR model from the University of Chicago might be enlisted to project changes in

¹⁷⁸ See Nordhaus, *supra* note 19.

¹⁷⁹ A valuable discussion, with a wealth of detail, can be found in *The Economic Geography of Global Warming*, available at <https://www.nber.org/papers/w28466#fromrss>.

¹⁸⁰ Robert S. Pindyck, *Climate Change Policy: What Do the Models Tell Us?*, 51 J. Econ. Lit. 860 (2013), available at <https://pubs.aeaweb.org/doi/pdfplus/10.1257/jel.51.3.860>.

¹⁸¹ *Id.*

¹⁸² Masur and Posner, *supra* note 19, at 1560.

¹⁸³ Pindyck, *supra* note 180, at 862.

¹⁸⁴ *Id.* at 865.

¹⁸⁵ *Id.* at 867.

¹⁸⁶ *Id.*

¹⁸⁷ *Id.* at 868.

¹⁸⁸ *Id.* at 869.

¹⁸⁹ *Id.* at 869 – 70.

temperature.¹⁹⁰ An analysis from Stanford researchers finds large adverse effects on economic growth, contributing to a social cost of carbon in excess of \$200.¹⁹¹ The IAMs are a work-in-progress, and the updates are meant to address some of the objections¹⁹²; an agency may or may not conclude that the updates have been adequate.

But my topic here is arbitrariness review, which should give the executive branch a great deal of room to maneuver, so long as it has given some sort of explanation for its choices (satisfying the procedural hard look), and so long as it has responded to the strongest objections (satisfying what ought to be a version of the substantive hard look). The real question is whether the scientific and economic grounds on which agency choices are based are sufficiently reasonable, which brings us to more specific issues.

E. Climate Sensitivity

Suppose that atmospheric concentrations of CO₂ increase significantly or even dramatically. What will be the effect on global temperatures? How sensitive are temperatures to increased concentrations? To answer such questions, we need to understand the potentially complex causal chains between emissions and temperature changes.¹⁹³ To take just one part of the puzzle, it should be agreed that higher concentrations of CO₂ produce warming and acidification of the oceans, which means that they will do less to remove CO₂ from the atmosphere – but what are the magnitudes here? To answer that question, multiple models are now available from which to choose. The different models show very different numbers. For a given increase in concentrations, some estimates suggest increased warming of 0.5 C, and others show increased warning of 7.0 C.¹⁹⁴ Writing several years ago, Pindyck puts it this way: “At this point we simply don’t know the true value of climate sensitivity. And that’s unfortunate, because climate sensitivity is a critical determinant of the temperature increases we can expect over coming decades.”¹⁹⁵

The choice of how best to proceed raises difficult scientific questions. In principle, the question is a technical one: Which model is best? Within the executive branch, it would be sensible to think that scientists have two tasks: to answer that question and then to explain their answer. In view of the highly technical nature of the underlying issues, courts should be expected to accept any reasonable answer, so long as it is sufficiently detailed and sufficiently responsive to counterarguments. Moreover, it must be acknowledged that if several models are plausible, and if it is unclear how to choose among them on purely technical grounds, policy judgments might play a role. For example, agencies might decide, on precautionary grounds, to choose a model that assumes a relatively high degree of climate sensitivity. So long as that choice is consistent with statute, it would not be unlawful.

¹⁹⁰ See Carleton and Greenstone, *supra* note 19.

¹⁹¹ Frances C. Moore and Delavane B. Diaz, *Temperature Impacts on Economic Growth Warrant Stringent Mitigation Policy*, 5 *Nature Climate Change* 127 (2015).

¹⁹² Nordhaus, *supra* note 19.

¹⁹³ See Carleton and Greenstone, *supra* note 19; Climate Change 2021, *supra* note 1.

¹⁹⁴ Robert S. Pindyck, *What We Know and Don’t Know About Climate Change, and Implications for Policy*, 61.

¹⁹⁵ *Id.* at 61 – 62. It is important to note that the IPCC believes that the range of reasonable disagreement is narrowing on this issue. See Climate Change 2021, *supra* note 1.

F. The Damage Function

Suppose that by 2100, the global temperature is 2.8 degrees warmer than it is right now. How much damage would be caused by that increase? To answer that question, we would to answer many other questions. Some of them involve science; some involve economics; some involve adaptation. With specified temperature changes, and accompanying threats (extreme heat, drought, wildfires, flooding), how would institutions, and individuals, alter their behavior? That is a daunting question, requiring a degree of speculation. (With respect to flooding and wildfire, how much adaptation will there be, in the United States, between now and 2075¹⁹⁶?) And after we answer that question, and specify the main kinds of damage, how can they be turned into monetary equivalents? Is that even possible? The IAMs were not, of course, based on empirical evidence. They were rooted in a series of simplifying assumptions.¹⁹⁷ They also assumed a degree of homogeneity across geographical regions, which is clearly a mistake. A specific rise in temperature in Los Angeles might have catastrophic effects; its effects might not be so terrific in Boston.

Carleton and Greenstone vigorously argue that the existing IAM damage functions should be replaced by new ones, which (1) are “empirically derived and plausibly causal,” (2) able to “capture low-level nonlinearities for the entire global population,” and (3) able to include adaptation.¹⁹⁸ Undertaking those tasks would require a relatively high degree of ambition, and in light of the stakes, a high degree of ambition is a good idea. But for purposes of arbitrariness review, we can restate now-familiar conclusions: Agencies should be obligated to explain their choices, to consider alternatives, to answer counterarguments, and to account for departures from past practices. Reliance on old models would be vulnerable – unquestionably so if that reliance is unexplained, and almost unquestionably so even if it is. But if agencies are relying on current data, and making responsible judgments about how to handle it, their choices should be upheld against an arbitrariness challenge.

G. Uncertainty

We have seen enough to know that with respect to the damage done by climate change, there is a great deal of uncertainty. (That is an understatement.¹⁹⁹) How might that be relevant to the social cost of carbon? Perhaps it is not relevant at all. Under the Obama, Trump, and (early) Biden administrations, uncertainty did not play any role in establishing the relevant numbers. On the other hand, there is reason to believe that people dislike uncertainty as such, and might be willing to pay something to avoid it. Perhaps the social cost of carbon should be adjusted to reflect that aversion to uncertainty.²⁰⁰

At the same time, there are at least three objections. First, the evidence in support of any such adjustment might be deemed speculative – too speculative for official use. Second, it is fair

¹⁹⁶ See generally MATTHEW KAHN, ADAPTING TO CLIMATE CHANGE (2021).

¹⁹⁷ Carleton and Greenstone, *supra* note 19, at 13.

¹⁹⁸ *Id.* at 14-18.

¹⁹⁹ See <https://www.nber.org/papers/w28466#fromrss>; Carleton and Greenstone, *supra* note 19; Pindyck, *supra* note 97.

²⁰⁰ See Carleton and Greenstone, *supra* note 19.

to ask whether people's aversion to uncertainty is rational. To know, we would have to reach some conclusions about rationality, and we would want to know more about that aversion. These are large questions; let us scratch some surfaces.

Consider the question whether you would prefer:

- (1) a sure gain of \$100, or
- (b) a 50 percent chance of gaining \$210 and a 50 percent chance of gaining nothing.

Many people would prefer (1), and it is not clear that they are making a mistake. But now consider the question whether you would prefer:

- (1) a sure loss of \$100, or
- (2) a 50 percent chance of losing \$101 and a 50 percent chance of losing \$10.

It should be evident that (2) is better, and if people would prefer (1), they would have to offer some kind of explanation. For the social cost of carbon, the implication is that the brute fact of aversion to uncertainty (to the extent that exists) may not be enough to justify including that fact in producing numbers. We need to know what accounts for it, and having done that, we need to evaluate it.

Third, *there might be uncertainties on both sides of the equation*. The damage from climate change is uncertain. So too, perhaps, for the damage caused by efforts to reduce greenhouse gas emissions. What would be the first-order, second-order, and third-order effects of costly emissions reductions strategies? Can they be projected with specificity? Or might there be a band of uncertainty surrounding them? Perhaps the worst-case scenarios associated with climate change justify a policy that takes uncertainty especially seriously, with respect to climate-related harm²⁰¹; but if there are uncertainties on both sides, that would have to be taken into account.

In view of these questions, we return to our broader theme. The procedural hard look would demand an explanation of relevant choices, and several different approaches would survive arbitrariness review. It should be acceptable to ignore uncertainty, perhaps on the ground that no clearly established method is available to account for it. It should be acceptable to use conventional tools for valuing it, so long as those tools were used in a responsible way.²⁰²

H. Backing Out A Number?

We have seen that specifying the damage from a ton of carbon emissions is an exceedingly challenging endeavor, and that some people believe that IAMs are radically incomplete, or that the specification is not possible.²⁰³ If we are convinced by that argument, and nonetheless seek to assign monetary values, we might be tempted to seek another route. Raising a large number of objections, Nicholas Stern and Joseph Stiglitz urge that existing methodologies are fatally

²⁰¹ See CASS R. SUNSTEIN, *AVERTING CATASTROPHE* 25 – 38 (2021).

²⁰² See *id.* at 30.

²⁰³ See Pindyck, *supra* note 97.

flawed.²⁰⁴ Among other things, those methodologies focus on the externalities from greenhouse gases and ignore “other failures of fundamental importance,” which “are associated with: (i) R&D and innovation; (ii) capital markets; (iii) networks (including grid structures, public transport, broadband, recycling) in which there is extensive need for coordination, in which prices play only a limited role in that coordination, and in which a variety of externalities arise; (iv) information (including around new products, carbon content of products); (v) co-benefits (including air, water and soil pollution).”²⁰⁵

Stern and Stiglitz also contend that it is crucially important to focus on moral issues, which include distributional questions (who is most at risk?) and the rights and interests of future generations. As they put it, “Climate change has very unequal impacts: it is usually the poorest people who are hit earliest and hardest; they live in more vulnerable areas, are less-well insured, and have weaker coping mechanisms. Those least responsible for emissions are among those most adversely affected.”²⁰⁶ In their view, “the IAM methodology and common model choices may result in systematic bias, downplaying the importance of strong action on climate change and underestimating the social cost of carbon.”²⁰⁷ They also draw attention to the endogeneity of preferences. For example, the costs of mitigation by behavioral adaptation might turn out to be lower than we anticipate. If people change their diets, and end up eating less meat, they might come to prefer those diets. In addition, an “increasing fraction of the population,”²⁰⁸ they suggest, believe that the environment has intrinsic value and would put weight on it. Stern and Stiglitz add that existing models devote too little attention to extreme risks and to uncertainty.

These various objections might well be taken one by one. Perhaps we could make adjustments, for some, most, or all of them, to existing approaches.²⁰⁹ Some of the discussion thus far is in fact about how to do that (with respect to, for example, equity and uncertainty). But instead of seeing if that is possible or desirable, Stern and Stiglitz suggested an altogether different course of action, one that does not depend on attempting to identify the social cost of carbon at all.

Their preferred approach would proceed in three steps: “first, describe the likely consequences from climate change, under current arrangements; second, examine how the economy and emissions could be managed to give a good chance of stabilizing at different temperatures; and third, combine these two elements into a judgement on an approach to a temperature target.”²¹⁰ In essence, they urge, we might adopt a constraint, which is “that the temperature (modelled as a function of the environmental state variables) never increase beyond 2 degrees C (compared to pre-industrial levels). With this additional constraint in place, we can calculate, in terms of marginal damages, the social cost of carbon along a path where

²⁰⁴ See Nicholas Stern and Joseph E. Stiglitz, *The Social Cost of Carbon, Risk, Distribution, and Market Failures: An Alternative Approach* (2021), available at <https://www.nber.org/papers/w28472>.

²⁰⁵ Id. at 4.

²⁰⁶ Id. at 5.

²⁰⁷ Id. at 7.

²⁰⁸ Id. at 50.

²⁰⁹ For skeptical remarks, see Masur and Posner, *supra* note 18, at 1563: “there is tremendous uncertainty about which human beings will be harmed, and where, and how much, and what weight those harms should have in the cost-benefit calculation. In the absence of this information, agencies cannot conduct proper cost-benefit analyses.”

²¹⁰ Stern and Stiglitz, *supra* note 204, at 58.

temperature is constrained below 2 degrees C.”²¹¹ In that way, we could essentially “back out” a social cost of carbon, not by projecting the damage from a ton of carbon emissions, but by specifying what the price on carbon would have to be, in order to ensure that the increase in global temperature does not exceed 2 degrees C.

Let us suppose, for purposes of discussion, that the resulting number would be \$100. Would that be arbitrary? Under certain assumptions, it would not be. Suppose that an analysis of all relevant costs and benefits suggested that a global cap of an increase of 2 degrees C would in fact be optimal – that a cap of 1.99 degrees C would be too low and that a cap of 2.01 degrees C would be too high. If so, then the social cost of carbon that one would “back out” from the cap would be the right number – and *it would be identical to the social cost of carbon that would emerge from the right IAM*. It follows that (1) *if* there were a world government, (2) *if* the world government could reasonably conclude, on the basis of an analysis of all relevant benefits and costs, that the maximum acceptable increase in warming would be 2 degrees C, and (3) *if* the world government could produce and make binding a monetary figure that would reflect what was necessary to ensure (2), then the Stern and Stiglitz argument would be convincing.

In light of all the uncertainties, however, it might be disputed that (2) is correct. Is the maximum acceptable warning really 2 degrees C? Or 1.85 degrees C? Or 1.75 degrees C? Or 1.52 degree C? But let us put that to one side and assume that for one or another reason, (2) is in fact correct. Even if that is so, there is no world government, which means that no institution has the authority to insist on a monetary figure that is necessary to ensure a maximum increase in warming of 2 degrees C. So the real question is this: Suppose that acting on its own, the United States chooses that monetary figure – say, \$100 -- and calls it the “social cost of carbon.” Would that be arbitrary?

There is a good argument that it would be. The \$100 would not reflect the social cost of carbon at all. It would not reflect the amount of damage done by a ton of carbon emissions. It would instead *reflect the tax that would ensure that the world would not exceed the specified limit, if the world’s nations agreed to that tax*. That is not a social cost of carbon. If an agency attempted to defend it as such, it would not be convincing, and arbitrariness review would result in invalidation.

But an agency might take a different approach. It might be transparent and honest and argue that it is using the \$100 figure not because it is the social cost of carbon, but because it is the amount that each nation would have to pay to ensure that the world would not exceed the specified limit. In other words, it would defend that number, and the methodology that produced it, on its own terms. It would not speak of the social cost of carbon at all.

Would *that* be arbitrary? The answer is not entirely clear, and (to return to the procedural hard look) much would depend on what, exactly, an agency actually said. But even if an agency says a great deal, the substantive hard look would raise serious questions. A reasonable effort to assess the damage done by a ton of greenhouse gas emissions would not be arbitrary (by definition). By contrast, a reasonable effort to require the level of stringency, in regulations, that all nations would adopt, if they imposed the necessary cost to ensure a kind of global “cap” (on

²¹¹ Id. at 59.

increased temperatures) *could not be defended in the standard cost-benefit terms of relevant executive orders*. It would have to be defended as an empirically-informed *policy judgment*, one that was part of a panoply of measures designed to ensure a desirable policy outcome. Perhaps an agency, or a government as a whole, might bite the bullet and urge that the Stern-Stiglitz approach was a component of a series of international negotiations designed to achieve the desired result. If it were so defended, and if the underlying empirical judgments were non-arbitrarily defended as well, it should and probably would be upheld.

V. Conclusion

In its modern form, arbitrariness review is best understood as an effort to promote, at once, deliberation and democracy. It promotes deliberation insofar as it requires a reasoned justification for agency choices. A disregard for scientific evidence, reckless claims about economics, failure to address plausible objections, an ipse dixit – all of these are fatal flaws. It follows that it is not sufficient for agencies to defer to political direction, even from the president personally. At the same time, arbitrariness review requires agencies to subject their justifications to public scrutiny and review; this is the sense in which it is democracy-promoting.²¹² The procedural hard look has that characteristic. Consistent with Judge Leventhal’s argument, a substantive hard look might be justified on the ground that it is necessary to ensure that the procedural hard look is not a charade. It might also be justified on the ground that it is necessary to ensure that deliberation has, in fact, occurred.

It is important to emphasize that judgments about institutional roles depend on judgments about institutional capacities; such judgments cannot be made in the abstract, or by reference (solely) to high ideals. On imaginable assumptions, arbitrariness review should entail only a very soft look, on both the procedural and substantive sides. On imaginable assumptions, Judge Leventhal was quite right, and courts should look carefully at the merits. I have urged here that on the most plausible assumptions about institutional capacities, technical questions should be reviewed on the merits with a high degree of judicial caution (restraint for sure, without abdication), but that it is important to insist on a procedural hard look, to avoid the risk of bias or error.

With respect to climate change, the social cost of carbon is the linchpin of national regulatory policy. It helps determine the stringency of a large number of regulations from diverse agencies. It also sets an international signal, and is likely to have international resonance, influencing the judgments of other nations. To produce a social cost of carbon, it is necessary to make numerous judgments about both science and economics, involving (among other things) the choice between the global and the domestic number, the discount rate, the role of the IAMs, climate sensitivity, the damage function, and equity. Minimal requirements of arbitrariness review are that agencies offer detailed explanations and respond to counterarguments, demonstrate their factual judgments are consistent with a reasonable reading of the science and the economics, and show that they have not made some kind of egregious error. Insofar as their judgments involve policy as well as fact – as is clearly the case with respect to the discount rate and equity, and as is plausibly the case with respect to climate sensitivity and the damage function – agencies must articulate those judgments and demonstrate that they are reasonable.

²¹² See Eidelson, *supra* note 23.

With respect to the social cost of carbon, some imaginable choices would be straightforward to defend against an arbitrariness challenge. Use of the global number, and a discount rate of 2 percent, are clear examples. A discount rate of 7 percent would be very difficult to defend; use of the domestic number would be challenging to defend. Equity poses particular difficulties -- conceptual, normative, and empirical. It would not be arbitrary to use a standard utilitarian approach, treating everyone equally and not making particular adjustments for equity. It would not be arbitrary to make such adjustments, perhaps because a given unit of money is worth more to the poor than to the wealthy, perhaps because those at the bottom of the economic ladder deserve priority. With respect to the scientific questions (the use of the IAMs, climate sensitivity, and the damage function), the technical disputes are unusually intense, and on technical grounds, or grounds of policy, different administrations could reasonably reach different conclusions. On such questions, courts should and almost certainly would tread lightly, so long as agencies have not ignored serious objections and concerns.

My most general claim has pointed to the relationship between arbitrariness review and the constitutional commitment to deliberative democracy, with the suggestion that both the procedural and the substantive hard look can be understood as surrogate safeguards, designed to make that old commitment real under new circumstances. In my view, this is the strongest argument for relatively aggressive arbitrariness review from the federal judiciary. Even for technical questions, including those involved in establishing a social cost of carbon, a procedural hard look is essential; *California v. Bernhardt* was rightly decided. A signal virtue of arbitrariness review is that it reduces the risk of large-scale instability in government, in which scientific and economic judgments are overridden by purely political considerations.²¹³ This is part and parcel of the commitment to *deliberative* democracy.

But with respect to the social cost of carbon, Judge Bazelon's cautionary notes deserve to be underlined and put in large font; a substantive hard look ought not to be all that hard.²¹⁴ With respect to the most difficult issues in science and economics, the executive branch should have, and likely will have, significant room to maneuver.

²¹³ Hence my partial disagreement with Masur and Posner, *supra* note 19, at 1599, who call for (roughly speaking) a political resolution, through a judgment from the president or Congress. In my view, Masur and Posner are quite right to point to the many technical challenges (some of them discussed here), but tend to understate the need for a large role, by technical analysts, in establishing a social cost of carbon. It is noteworthy that consistent with the recommendation from Masur and Posner, President Biden did speak explicitly to the issue – by calling for specification of the appropriate numbers from a technical working group (!), and also for a global rather than domestic figure. It is also noteworthy that President Trump disbanded the technical working group and gave a strong signal of what he wanted (the domestic figure and the standard discount rates), and that when challenged, a decision by one of his agencies was struck down, and rightly so, in part on the ground that use of the domestic figure had not been adequately justified. See *supra*.

²¹⁴ See Gersen and Vermeule, *supra* note 76.

