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DISTRIBUTIONAL CONSEQUENCES AND REGULATORY ANALYSIS

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Distributional analysis has been a formal part of the regulatory state since 1993, when President Clinton directed agencies to consider the distributional consequences of significant regulations alongside the cost-benefit analysis of these regulations. President Obama reaffirmed and somewhat expanded this commitment. And both Presidents Clinton and Obama expressed particular concerns with distributional consequences in the environmental area, underscoring their respective commitments to environmental justice. Despite the undoubtedly good intentions embodied in these pronouncements, the analysis of the distributional consequences of regulation has never gotten off the ground. Unlike cost-benefit analysis, it has not become a meaningful part of the analysis of regulatory consequences.

In his first day in office, President Biden issued a Presidential Memorandum on Modernizing Regulatory Review, which calls on the Office of Management and Budget to propose procedures for analyzing the distributional consequences of regulations. This Article focuses on what it would take for the Biden effort to succeed where the Clinton and Obama efforts failed. In particular, agencies will need to be provided with clear guidance on the methodologies used to conduct distributional analysis. The lack of a standardized approach is part of the reason that the prior efforts were doomed. Moreover, agencies will need to take seriously the already existing requirement, so far honored only in the breach, of analyzing the distributional consequences of different regulatory alternatives. Otherwise, they will never be in a position to answer the key question in this area: when are the better distributional consequences of one alternative sufficient to overcome another alternative's higher net benefits?

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INTRODUCTION

Cost-benefit analysis has been a significant component of the regulatory state since the 1980s.[1] First, President Reagan in Executive Order 12,291,[2] and then, President Clinton in Executive Order 12,866,[3] prescribed that administrative agencies in the Executive Branch should undertake such analysis as part of their justification for promulgating significant regulations. Both orders also directed the Office of Information and Regulatory Affairs (OIRA) to oversee this review process, and, in particular, to review the manner in which agencies conducted their cost-benefit analyses of individual rules.[4]

Cost-benefit analysis focuses only on aggregate costs and aggregate benefits. It does not take account of who bears these costs and benefits. For example, a regulation reducing the emissions of an air pollutant could be cost-benefit justified if its benefits outweigh its costs,[5] even if the

[1] See RICHARD L. REVESZ & MICHAEL LIVERMORE, RETAKING RATIONALITY: HOW COST BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 21–44 (2008).
[2] Exec. Order No. 12,291, 3 C.F.R. § 127 (1981).
[3] Exec. Order No. 12,866, 3 C.F.R. § 638 (1993).
[4] *See* Nicholas Bagley & Richard L. Revesz, *Centralized Oversight of the Regulatory States*, 106 COLUM. L REV. 1260 (2006).
[5] Cost-benefit analysis requires not only that a regulation's benefits exceed its costs but also the maximization of net benefits, which are the benefits minus the costs. *See infra* text accompanying notes 239–241.

emissions reductions all benefit a high-income, White neighborhood, and the costs are all borne by a low-income, minority neighborhood.

To address troubling distributional consequences of this sort, both the Clinton order and Executive Order 13,563, promulgated by President Obama, instruct agencies to consider (and OIRA to review) "distributive impacts" and "equity," alongside the cost-benefit analysis when evaluating potential regulations.[6] And, relatedly, both Presidents Clinton and Obama promulgated separate executive orders to address concerns about environmental justice—the disproportionate impact of pollution of disadvantaged communities.[7]

The intentions expressed in these presidential pronouncements were undoubtedly well-meaning ones. Nonetheless, these efforts have so far failed to move the needle.[8] Indeed, the efforts to make distributional analysis a meaningful component of the evaluation of regulation,[9] or, for that matter, even a non-trivial component, cannot be regarded as anything other than a failure.

As a result, on the first day of his administration, President Biden promulgated a President Memorandum on Modernizing Regulatory Review, which directs the Office of Management and Budget, among other tasks, to "propose procedures that take into account the distributional consequences of regulations . . . to ensure that regulatory initiatives appropriately benefit and do not inappropriately burden disadvantaged, vulnerable, or marginalized communities."[10] On this score, the language of President Biden's memorandum is not meaningfully different from the language of the pronouncements of Presidents Clinton and Obama. This similarity raises an obvious question: What would it take for the Biden effort to succeed where the Clinton and Obama efforts failed?

This Article seeks to answer that question and to set the groundwork for the Biden administration's next steps on this important matter. The Article makes two core claims. First, for distributional analysis to become a significant part of the regulatory landscape, it will be necessary for agencies to have detailed guidance on how to standardize the manner in which such analysis is conducted. Unlike the case of cost-benefit, which is an established discipline with generally accepted professional norms,[11] there is currently no consensus on how distributional analysis should be conducted. Different studies employ significantly different methodologies, and, as a result, distributional analyses are not comparable across regulations and

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[6] Exec. Order No. 12,866, *supra* note 3, § 1(a); Exec. Order No. 13,563, 76 Fed. Reg. 3821, § 1(b)(3) (Jan. 21, 2011).

[7] *See infra* text accompanying notes 33–38.

[8] *See* Clinton G. Wallace, *Centralized Review of Tax Regulations*, 70 ALA. L. REV. 455, 469 (2018) (arguing that "the directive to include distributional analysis is very often disregarded, and scholars and policymakers have lamented the scant attention paid to distribution in regulatory analysis"); Richard Williams & James Broughel, *Principles for Analyzing Distribution in Regulatory Impact Analysis*, GEORGE MASON UNI. MERCATUS CENTER 1 (2015) ("With the exception of the legally required analysis for small entities (called regulatory flexibility analysis), agencies rarely conduct a general distributional analysis of the parties likely to receive benefits and bear costs.").

[9] *See* Richard L. Revesz, *Regulation and Distribution*, 93 N.Y.U. L. REV. 1489, 1491 (2018).

[10] Memorandum from President Joseph Biden on Modernizing Regulatory Review to the Heads of all Dep'ts & Agencies, 86 Fed. Reg. 7223, § 2(b)(2) (Jan. 26, 2021).

[11] *See* MICHAEL A. LIVERMORE & RICHARD L. REVESZ, REVIVING RATIONALITY: SAVING COST-BENEFIT ANALYSIS FOR THE SAKE OF THE ENVIRONMENT AND OUR HEALTH 51–77 (2020).

it is therefore not possible for agencies to determine in an objective way when particular consequences should raise concern. For the Biden effort to succeed, agencies will need to be provided with detailed guidance in a revision to Circular A-4, the document that instructs agencies on how to conduct regulatory impact analyses.[12] Currently, Circular A-4, which dates back to the George W. Bush administration, deals with distributional issues in a perfunctory and unhelpful manner. We set forth some principles that should guide the needed standardization but explain why a robust stakeholder process will be necessary to give this process legitimacy.

The Article's second core claim is conceptually more straightforward. The analysis of alternatives is a central element of regulatory impact analysis and Circular A-4 gives agencies detailed guidance on how it should be conducted. Agencies typically follow the command for cost-benefit analyses. In contrast, they have routinely ignored it, under administrations of both parties over a quarter of a century, for distributional analysis, for which it is no less relevant.[13] And OIRA, which is charged with reviewing the regulatory impact analyses conducted by agencies, has never called them to task for this failure. If agencies do not analyze the distributional consequences of different regulatory alternatives, they will never be in a position to face the key issue that needs to be addressed for distributional analysis to be meaningful: when are the better distributional consequences of one alternative sufficient to overcome another alternative's higher net benefits?

The Article is organized as follows. Part I discusses pronouncements of Presidents Clinton and Obama that made distributional considerations—and related concerns involving environmental justice—relevant to regulatory review analysis and shows how the formal requirements were never implemented in a meaningful manner. Most strikingly, it shows how in the major environmental regulations promulgated by the Obama administration, distributional consequences were considered only in a tautological way devoid of any substantive content.

Part II reviews an important set of environmental justice studies. It shows that there is no consensus on the major methodological elements that need to be evaluated to determine whether policies have disproportionate effects on particular groups. Instead, different studies use significantly different approaches without providing much explanation for the various choices. As a result, there is a risk that the methodologies will be manipulated to reach a predetermined result.

Part III then argues for the importance of standardizing the methodologies and provides suggestions on how that might be done. Additionally, it stresses the importance of stakeholder input into this process. The approach to standardization that will emerge from this process should be reflected in revisions to Circular A-4, to provide agencies with the guidance that they have lacked until now.

Lastly, Part IV deals with three key decisions that the Biden administration will need to make, beyond standardization, to turn the goals embodied in its presidential memorandum into a reality. First, OIRA needs to provide robust policing of the requirement, already expressed in

[12] Office of Mgmt. & Budget, Circular A-4 (2003) [hereinafter Circular A-4], https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf
[13] *See infra* text accompanying notes 73, 79, 91.

Circular A-4 but so far honored only in the breach, that agencies analyze the distributional consequences of different regulatory alternatives, at least for the alternatives analyzed as part of their cost-benefit analyses. Second, Part IV argues that distributional analysis should be conducted alongside a traditional cost-benefit analysis, instead of being incorporated into a social welfare function through the assignment of distributional weights. Third, it explains how the better distributional consequences of one alternative can be traded off against the higher net benefits of a different alternative.

I. THE LEGAL LANDSCAPE ON DISTRIBUTION

In 1981, President Reagan signed Executive Order 12,291,[14] which set up the centralized review of agency regulations performed by OIRA.[15] It also required agencies to perform a cost-benefit analysis of any "significant" regulation.[16] The purpose of cost-benefit analysis is to ensure that all regulatory actions undertaken create "potential benefits to society [that] outweigh the potential costs to society."[17] Cost-benefit analysis rests upon the economic principle of Kaldor-Hicks efficiency: the agency "weighs" the benefits against the costs, without any consideration of who pays the costs nor who receives the benefits. In other words, this approach takes no account of distributional consequences.[18]

Despite the negative reception Executive Order 12,291 received from regulatory advocates,[19] President Clinton retained the framework from the Reagan order in his own Executive Order 12,866, which similarly requires agencies to conduct cost-benefit analyses of "significant" regulations and submit them to OIRA for review.[20] There are, however, important differences. For example, the language regarding costs in the Clinton order replaced a requirement that benefits should "outweigh" with an instruction that benefits should "justify" the costs.[21] The Clinton order also addressed concerns that OIRA review placed too much focus on quantifiable costs and benefits by directing agencies to consider measures "that are difficult to quantify, but nevertheless essential to consider."[22] Executive Order 12,866 cemented cost-benefit analysis as a key feature of the administrative state.[23] Since then, it has become the blueprint used throughout the five subsequent presidential administrations of both parties.[24] President Obama reaffirmed the Clinton order in Executive Order 13,563,[25] as did President Trump in Executive Order 13,771.[26]

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[14] Exec. Order No. 12,291, *supra* note 2.
[15] *See id.* § 3(e)(1).
[16] *Id.* § 2(b).
[17] *Id.*
[18] The Kaldor-Hicks approach "requires only that losers from an action can *potentially* be compensated for their losses out of the winners' gains, not that they are actually made whole inside the policy." H. Spencer Banzhaf, *Regulatory Impact Analyses of Environmental Justice Effects*, 27 J. LAND USE & ENV'T L. 1, 13 (2011).
[19] *See* Sally Katzen, *OIRA at Thirty: Reflections and Recommendations*, 63 ADMIN. LAW REV. 103, 104–05 (2011).
[20] *See id.*; Exec. Order No. 12,866, *supra* note 3.
[21] *Compare* Exec. Order No, 12,866, *supra* note 3, § 1(b)(6), *with* Exec. Order No. 12,291, *supra* note 2, § 2(b).
[22] Exec. Order No. 12,866, *supra* note 3, § 1(a).
[23] *See* REVESZ & LIVERMORE, *supra* note 1, at 31–32.
[24] *See* Revesz, *supra* note 9, at 1491.
[25] *See* Exec. Order No. 13,563, *supra* note 6, § 1(b).
[26] *See* Exec. Order No. 13,771, 82 Fed. Reg. 9339, §3 (Jan. 30, 2017).

Both President Clinton and President Obama included references to distribution in their respective Executive Orders, instructing agencies to consider both "distributive impacts" and "equity."[27] However, after several decades of cost-benefit analysis practice, agencies still do not engage in serious distributional analysis.[28] Nor does OIRA give distributional analysis serious consideration.[29] Section A describes past efforts to introduce distributional analysis into the review process. Section B discusses the academic consensus that distributional analysis has not played a meaningful rule and confirms this conclusion by reviewing three major environmental regulations promulgated by the Obama administration.

A. *Governing Documents*

This Section describes the treatment of distributional issues in the regulatory review process as well as explicit presidential directions to take environmental justice considerations into account in the regulatory process and other government decisions. It explains how distributional concerns first became part of this framework during the Clinton administration; discusses the treatment of distributional issues in the primary guidance document for regulatory review, which dates back to the George W. Bush administration; and examines various extensions adopted during the Obama administration.[30]

1. *Distributional Analysis Under President Clinton*

Executive Order 12,866 first introduced consideration of distributional impacts into the regulatory process. The order directs agencies to consider a number of factors beyond costs and benefits, including "distributive impacts, and equity."[31] However, neither this order nor any Clinton-era guidance operationalize that directive.

Following the publication of a report by the Environmental Protection Agency (EPA) finding that racial minority and low-income populations experience higher than average exposures to pollution, increased pressure emerged to address such distributional concerns in a more robust way.[32] In response, President Clinton issued Executive Order 12,898, which directs all federal agencies to identify "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority [] and low-income populations" and to devise strategies for implementing "environmental justice."[33]

Executive Order 12,898 does not instruct agencies on *how* to perform environmental justice analysis, but federal agencies have issued guidance documents, the first of which was

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[27] *See* Exec. Order No. 12,866, *supra* note 3, § 1(a); Exec. Order No. 13,563, *supra* note 6, § 1(b)(3).
[28] *See* Revesz, *supra* note 9, at 1491.
[29] *See id.*
[30] President Biden issued several presidential directives concerning equity and justice, including the Presidential Memorandum on Modernizing Regulatory Review, which directs OMB to "propose procedures that take into account the distributional consequences of regulations . . . to ensure that regulatory initiatives appropriately benefit and do not inappropriately burden disadvantaged, vulnerable, or marginalized communities." Modernizing Regulatory Review, *supra* note 10, § 2(b)(2). However, it is too early to evaluate the impact of these actions.
[31] Exec. Order No. 12,866, *supra* note 3, § 1(a).
[32] *See* H. Spencer Banzhaf et al., *Environmental Justice: Establishing Causal Relationships*, 11 ANN. REV. RES. ECON. 377, 379 (2019).
[33] Exec. Order No. 12,898, § 1-101, 59 Fed. Reg. 7629 (Feb. 11, 1994).

published in 1997 by the Council on Economic Quality.[34] EPA's 2014 "Plan EJ," named in recognition of the Clinton's 12,898 Order, describes the agency's environmental justice goal as "more effectively protect[ing] human health and the environment for overburdened populations."[35] The EPA's most recent guidance on environmental justice can be found in its 2016 internal document "Technical Guidance for Assessing Environmental Justice in Regulatory Analysis."[36] Rather than endorse a particular methodology, this document presents several descriptive analytic methods from which analysts are encouraged to choose the best way to describe distributive impacts.[37] It provides little guidance on how to empirically measure the full distribution of a regulatory action's costs and benefits.[38]

2. *Circular A-4*

If Executive Order 12,866 is the blueprint for centralized review, then Circular A-4 serves as the instruction manual. Circular A-4 is a technical, 48-page document that instructs agencies on how to perform the various analyses for centralized review.[39] Developed by the Office of Management and Budget (OMB) under the Bush administration in 2003, this document has served for the last two decades as the primary guidance for the preparation of regulatory analyses to comply with the mandate of the Clinton order.

The bulk of Circular A-4 instructs agency officials on how to estimate costs and benefits. Indeed, the introduction indicates that the Circular's purpose is to "assist analysts in the regulatory agencies by defining good regulatory analysis . . . and standardizing the way benefits and costs of Federal regulatory actions are measured and reported."[40] In this connection, Circular A-4 instructs agencies how to develop a baseline, how to estimate costs and benefits, how to determine the appropriate discount rate, and how to account for uncertainty.[41] These materials occupy approximately 30 pages of the document.[42]

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[34] *See Environmental Justice Guidance Under the National Environmental Policy Act*, COUNCIL ON ENV'T QUALITY (1997), https://www.epa.gov/sites/production/files/2015-02/ documents/ej_guidance_nepa_ceq1297.pdf.
[35] PLAN EJ 2014, U.S. ENV'T PROT. AGENCY (2014), https://nepis.epa.gov/Exe/ZyPDF.cgi/P100DFCQ.PDF?Dockey=P100DFCQ.PDF; *Plan EJ 2014 Background*, U.S. ENV'T PROT. AGENCY (last updated Mar. 13, 2017), https://www.epa.gov/environmentaljustice/plan-ej-2014 [https://perma.cc/5EDS-9XYK].
[36] EPA, Technical Guidance for Assessing Environmental Justice in Regulatory Analysis (2016) [hereinafter Technical Guidance], https://www.epa.gov/sites/ production/files/2016-06/documents/ejtg_5_6_16_ v5.1.pdf.
[37] The analytic methods presented include: "summary statistics" demonstrating effects for different types of individuals across groups; "visual displays" such as maps, charts or graphs; "proximity-based analysis" which compares the demographic characteristics of groups affected by a particular pollution source; "use of exposure data" to characterize differences in health effects; and "qualitative approaches" which serves as a catch-all similar to that found in Circular A-4. *Id.* at 48-52; *see* Circular A-4, *supra* note 12, at 26 ("Sound quantitative estimates of benefits and costs . . . are preferable . . . However, some important benefits and costs . . . may be inherently too difficult to quantify or monetize").
[38] *See* Technical Guidance, *supra* note 36, at 57–58 ("Even in cases where the information would be relevant, data or methods may not exist for full examination of the distributional implications of costs across population groups of concern).
[39] *See* Circular A-4, *supra* note 12, at 1–2.
[40] *Id.* at 1.
[41] *See* Circular A-4, *supra* note 12, at 15–45.
[42] *See id.; see also* Bagley & Revesz, *supra* note 4, at 1326.

In contrast, Circular A-4 contains only two paragraphs, in half a page, on "distributional effects," which it defines as the "impact of a regulatory action across the population and economy, divided up in various ways (e.g., income groups, race, sex, industrial sector, geography).[43] The discussion provides virtually no guidance, merely indicating that regulatory analyses "provide a separate description of distributional effects ... described quantitatively to the extent possible."[44]

3. *Distributional Analysis Under President Obama*

President Obama reaffirmed the Clinton Order's commitment to considering distributional impacts. In fact, Executive Order 13,563 uses exactly the language: agencies should select "those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; *distributive impacts*; and *equity*)."[45] The order also includes an additional clause, directing agencies to "consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts."[46] But, once again, no guidance is provided on how the distributional analysis should be conducted.

President Obama similarly reaffirmed the Clinton commitment to promoting environmental justice. Executive Order 13,653, "Preparing the United States for the Impacts of Climate Change,"[47] acknowledges that climate change "impacts are often most significant for communities that already face economic or health-related challenges."[48] But while it indicates that "[m]anaging these risks requires deliberate preparation, close cooperation, and coordinated planning," [49] neither the order itself nor the subsequent administration actions provide guidance on how to assess, or address, the distribution of these impacts. For example, the resulting Climate Action Plan advanced policies to cut carbon pollution across the board without reference to distribution,[50] as is reflected in the regulatory initiatives discussed in Section B.

B. *Empirical Assessments*

A review of the secondary literature and a direct review of regulatory impact assessments performed for major regulations reveal that despite President Clinton's and Obama's directives to consider distributive impacts, agencies rarely engage in such analysis. Furthermore, even where these impacts are discussed, no serious analysis is done.

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[43] *See* Circular A-4, *supra* note 12, at 14.
[44] *See id.*
[45] *Compare* Exec. Order No. 12,866, *supra* note 3, § 1(a), *with* Exec. Order No. 13,563, *supra* note 6, § 1(b)(3).
[46] Exec. Order No. 13,563, *supra* note 6.
[47] Exec. Order No. 13,653, 3 C.F.R. § 330 (2013)*; see also* Proclamation No. 9082, 79 Fed. Reg. 8819 (Feb. 10, 2014).
[48] *Id.* § 1
[49] *Id.*
[50] *See* EXECUTIVE OFFICE OF THE PRESIDENT, THE PRESIDENT'S CLIMATE ACTION PLAN 5 (2013), https://obamawhitehouse.archives.gov/sites/default/files/image/president27sclimateactionplan.pdf.

1. *Academic Literature*

The academic literature establishes that neither President Clinton's nor President Obama's efforts concerning the distributional consequences of regulation led to robust analysis or meaningfully affected agency decisions. Instead, the clear conclusion from the literature is that the presidential pronouncements did not move the needle on distributional analysis in any meaningful way.

In 2016, Lisa Robinson et al. reviewed 24 of President Obama's major regulations with quantified health benefits from Fiscal Years 2010 through 2013.[51] This review is the most comprehensive examination of whether and how agencies perform distributional analysis in the course of preparing the regulatory impact assessment required for OIRA. The authors found that, although federal agencies are expected to assess the distributional impacts of major regulations, "these analyses pay relatively little attention to distribution; often they merely address the extent to which the regulation protects the health of low-income and minority groups and children."[52] The authors suggested that agencies assume that distributional impacts are not significant enough to warrant detailed analysis, [53] and speculated that the failure to seriously consider distribution may be due to several pragmatic challenges, including political and legal concerns, as well as technical and resource constraints.[54] They also cited the lack of detailed guidance as a critical constraint that hinders agency staff who may otherwise be motivated to engage in distributional analysis.[55]

Similarly, in 2003, focusing on the two Clinton orders, Robert Hahn et al. explained that while "[i]n practice, agencies have responded … by including a separate distributional impact analysis" in their regulatory analyses "only infrequently was quantitative analysis included." [56] Most importantly, the authors noted that "[i]n no case did the Administration's explicit concern for equity clearly alter proposed policies."[57]

The situation had not improved 15 years later. In a 2018 article, Jerry Ellig argued that, at a minimum, agencies should provide a "simple type" of distributional analysis, amounting to an identification of who receives the benefits and who receives the costs of the new rule.[58] Yet, he found that even "[t]his seemingly simple type of distributional analysis is rare."[59]

Also in 2018, Richard Revesz observed that most agencies did not take distributional concerns "into account at all, or at most gave them a cursory treatment."[60] He noted that EPA

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[51] *See* Lisa A. Robinson, James K. Hammitt & Richard J. Zeckhauser, *Attention to Distribution in U.S. Regulatory Analyses*, 10 REV. ENV'T. ECON. & POL'Y 308, 316 (2016).
[52] *Id.* at 323.
[53] *See id.* at 320.
[54] *See id.*
[55] *See id.* at 322.
[56] Robert W. Hahn et al., *Environmental Regulation in the 1990s: A Retrospective Analysis*, 27 HARV. ENV'T. L. REV. 377, 405 (2003).
[57] *Id.*
[58] Jerry Ellig, *Why and How Independent Agencies Should Conduct Regulatory Impact Analysis*, 28 CORNELL J.L. & PUB. POL'Y 1, 27 (2018).
[59] *Id.*
[60] Revesz, *supra* note 9, at 1542.

regulatory staff does not appear to take its own environmental justice guidance seriously: only seven of nearly 4000 Obama-era EPA rules took environmental justice concerns into account in their analyses.[61] And, in a more recent piece, he attributed the lack of "any actionable guidance on *how* distributional issues should be taken into account" as one potential reason why distribution has not been a robust feature of agency regulatory analyses or OIRA regulatory reviews.[62]

2. *Major Environmental Regulations*

The regulatory impact assessments of President Obama's major environmental initiatives expose at best a perfunctory approach to distributional analysis. We reviewed the assessments of the following three regulations because they are arguably the most important recent environmental rules: the Cross-State Air Pollution Rule; the Mercury and Air Toxics Standards; and the Clean Power Plan. Each of the rulemakings affect stationary sources of pollution. Regulation of stationary sources of pollution particularly implicate distributional issues due to the combination of place-based pollution and both racial and socioeconomic residential segregation. Each of the regulatory analyses assumes that the rule will be beneficial for all groups regardless of race because it will result in a net reduction in emissions. But there is no analysis whatsoever of whether the disparities that would remain even with the regulation are troubling, whether a more stringent standard could reduce those disparities, and whether such an outcome could be preferable. This failure is particularly serious because Circular A-4 identifies "an examination of alternative approaches" as one of the three basic elements of "a good regulatory analysis."[63]

The EPA promulgated Cross-State Air Pollution Rule in 2011, replacing the 2005 Clean Air Interstate Rule, which the D.C. Circuit had struck down.[64] The rule, promulgated under the Clean Air Act's Good Neighbor Provision,[65] was designed to reduce air pollution in 22 states that are upwind of states that would otherwise be unable to meet the National Ambient Air Quality Standards.[66] In 2013, for example, 93% of the air pollution in parts of Connecticut originated in upwind states.[67] As a result, absent emissions reductions in those states, Connecticut would not be able to come into compliance with the ambient standards.[68]

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[61] *See id.* at 1540.
[62] Richard L. Revesz, *A New Era for Regulatory Review*, REGUL. REV. (Feb. 16, 2021), https://www.theregreview.org/2021/02/16/revesz-new-era-regulatory-review/?utm_source=The+Regulatory+Review+newsletter+and+alert+subscribers&utm_campaign=e10f8769c1-EMAIL_CAMPAIGN_4_23_2019_6_54_COPY_01&utm_medium=email&utm_term=0_d70039d0ef-e10f8769c1-711774509.
[63] Circular A-4, *supra* note 12, at 2.
[64] *See Overview of the Cross-State Air Pollution Rule (CSAPR)*, U.S. ENV'T PROT. AGENCY (last updated Apr. 30, 2020), https://www.epa.gov/csapr/overview-cross-state-air-pollution-rule-csapr; *North Carolina v. EPA*, 550 F.3d 1176 (D.C.C. 2008).
[65] *See* Coral Davenport, *Justices Back Rule Limiting Coal Pollution*, N.Y. TIMES (Apr. 29, 2014), https://www.nytimes.com/2014/04/30/us/politics/supreme-court-backs-epa-coal-pollution-rules.html?searchResultPosition=12.
[66] *See* Overview of the Cross-State Air Pollution Rule, *supra* note 64.
[67] *See* Davenport, *supra* note 65.
[68] *See A Fight Over Cross-State Pollution*, N.Y. TIMES (Dec. 13, 2013), https://www.nytimes.com/2013/12/14/opinion/a-fight-over-cross-state-pollution.html?searchResultPosition=6.

The rule's regulatory analysis is 414 pages long.[69] It is composed of 10 chapters focusing on the following substantive topics: emissions impacts, air quality impacts, benefits analysis, cost and economic impacts, macroeconomic and employment impacts. There is only a two-page discussion of environmental justice issues, indicating that EPA considered the rule's impacts on low-income, minority, and tribal communities.[70] Specifically, it referenced a distributional analysis that "estimated the PM2.5 mortality risks according to race, income, and educational attainment before and after implementation of the Transport Rule."[71] EPA took solace in the fact that "all populations [will] see their mortality risk fall" as a result of the rule.[72] However, the report provides no quantified characterization of a distribution of costs or benefits. Importantly, even though EPA assessed the costs and benefits of two regulatory alternatives (one less stringent, one more stringent), it performed the distributional analysis only for the proposed rule.[73] Thus, the agency did not even seek to determine whether an alternative might have better distributional consequences.

EPA issued the second of the rules, the Mercury and Air Toxic Standards, in 2011 following a consent decree resolving a 2008 lawsuit that alleged the EPA had failed to issue statutorily mandated standards for hazardous air pollutants from power plants.[74] The rule's regulatory analysis is 510 pages long. Twenty-one of these pages are devoted to issues related to distribution and environmental justice. The document describes a distributional analysis that identified the nation's counties where PM2.5 mortality risk distribution would be at or above the median and upper 95th percentile (1) before and (2) after implementation of the rule.[75] It includes a number of graphs, maps, and tables, including a table that describes the "Estimated Change in the Percentage of All Deaths Attributable to PM2.5 Before and After Implementation of MATS by 2016 for Each Populations, Stratified by Race."[76]

EPA concluded that all populations, including subpopulations protected by Executive Order 12,898, could benefit from a reduction in PM2.5 mortality risk. However, it also noted that "limits to data resolution prevent us from delineating the PM2.5 mortality risk according to population race with confidence."[77] These assertions are based on a presumption that because the rule will result in reduced emissions overall, that vulnerable populations will also experience reduced emissions. For example, the regulatory impact analysis states "to the extent that any minority, low income, or indigenous subpopulation is disproportionately impacted *by the current emissions* as a result of the proximity of their homes to these sources, *that subpopulation also stands to see increased environmental and health benefit* from the emissions reductions called for by this rule."[78] As in the case of the Cross-State Air Pollution rule, EPA's distributional

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[69] *See* U.S. Env't Prot. Agency, Regulatory Impact Analysis for the Cross-State Air Pollution Rule (2011).
[70] *See id.* at 323.
[71] *Id.* (the referenced analysis can be found in section XII. J of the preamble for the Final Rule).
[72] *Id.* at 334.
[73] *See id.* at 323.
[74] *See EPA Announces Mercury and Air Toxics Standards (MATS) for Power Plants - Rules and Fact Sheets*, U.S. ENV'T PROT. AGENCY (Dec. 21, 2011), https://www.epa.gov/mats/epa-announces-mercury-and-air-toxics-standards-mats-power-plants-rules-and-fact-sheets; MATS rule p. 9308.
[75] *See* U.S. Env't Prot. Agency, Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards 7-51–52 (2011).
[76] *Id.* at 7-52.
[77] *Id.* at 7-54.
[78] *Id.* at 7-36.

analysis is essentially based on the syllogism that disadvantaged communities are disproportionately affected by air pollution, that the rule in question will reduce such pollution, and that, therefore it must be advantageous to the disadvantaged communities. But the agency makes no effort to ascertain whether the remaining distributional disparities are acceptable, or whether some alternative would have better distributional consequences.

For the final cost-benefit calculation, the regulatory impact analysis compares the chosen regulation only to the baseline (a scenario with no change to the regulatory scheme.)[79] While the document analyzes the average mercury deposition levels for three different emissions control scenarios,[80] the discussion of distribution is confined only to the potential "implementation of *this final rule.*"[81] Thus, as with the Good Neighbor rule, the agency did not consider whether a regulatory alternative might have better distributional consequences than the final rule.

Moreover, these analyses are not sophisticated enough to support decisionmaking with regards to distribution. For example, the analysis of socioeconomic distribution identified "does NOT identify the demographic characteristics of the most highly affected individuals or communities."[82]

Finally, the Clean Power Plan was an EPA regulation designed to limit the greenhouse gas emissions of existing power plants,[83] which, in 2012, accounted for 38% of U.S. carbon dioxide emissions and 31% of U.S. emissions of other greenhouse gases.[84] An indirect benefit, or co-benefit of this rule was that it would also lead to significant reductions in the emissions of particulate matter, thereby leading to 1500–3600 fewer premature deaths, 1700 fewer premature heart attacks, and 90,000 fewer asthma attacks in children.[85]

EPA's regulatory analysis for the Clean Power Plan is 344 pages long. Less than one page is devoted to a discussion of the health concerns for low-income households with children. The report merely summarizes prior research findings with regards to the vulnerabilities of these households.[86] It states in a conclusory manner that "[a]dditional health concerns may arise in low income households, especially those with children, if climate change reduces food availability and increases prices, leading to food insecurity within households."[87]

The report devotes approximately four pages to the discussion of environmental justice. [88] It claims that because minority communities are disproportionately affected by climate change,

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[79] *See id.* at ES-2.
[80] *See id.* at 4-54 to 4–56.
[81] *Id.* at 7-35.
[82] *Id.*
[83] *See* Fact Sheet: Overview of the Clean Power Plan, U.S. Env't Prot. Agency (last updated May 9, 2017), https://archive.epa.gov/epa/cleanpowerplan/fact-sheet-overview-clean-power-plan.html [https://perma.cc/CF3G-W4BY]. The rule was subsequently rescinded by the Trump administration. *See* Repeal of the Clean Power Plan, 40 C.F.R. § 60 (2019).
[84] *See* U.S. Env't Prot. Agency, Regulatory Impact Analysis for the Clean Power Plan 2-24 (2015).
[85] *See id.* at 4-31*; see also Fact Sheet: Clean Power Plan By The Numbers*, U.S. ENV'T PROT. AGENCY (last updated May 9, 2017), https://archive.epa.gov/epa/cleanpowerplan/fact-sheet-clean-power-plan-numbers.html [https://perma.cc/JZ86-M8DR] (providing top-line, relevant numbers from the RIA).
[86] *See* Regulatory Impact Analysis for the Clean Power Plan, *supra* note 84, at 7-17.
[87] *Id.* at 7-17.
[88] *See id.* at 7-18–7-21.

such communities will be disproportionately benefitted by the Clean Power Plan. It bases this contention simply on the assertion that the rule will result in a reduction of greenhouse gases. The report also claims that "the EPA has taken a number of actions to help ensure that this action will not have potential disproportionately high and adverse human health or environmental effects on overburdened communities." [89] But it provides no accounting of or description of these actions.[90] As with the case of the other two rules discussed, the distributional analysis concludes that the rule's impacts cannot be problematic because it will reduce pollution. But, again, EPA makes no effort to determine whether the remaining disparities are troubling.

As with the other two rules discussed above, the analysis does not provide any comparison of the distribution of the proposed action to those of other alternatives the agency considered. Rather, the report simply presumes that because "[l]ow-income populations have been generally found to have a higher prevalence of pre-existing diseases, limited access to medical treatment, and increased nutritional deficiencies . . . low-income populations will also benefit from such emissions reductions."[91]

The review of the academic literature coupled with our review of the major EPA regulations promulgated during the Obama administration establish that, despite repeated presidential directives to do so, agencies have not seriously considered distributional impacts when evaluating the consequences of regulations. In particular, the regulatory analyses rely on a syllogistic boilerplate that says that because pollution disproportionately affects disadvantaged communities, and because the regulation in question is designed to reduce pollution, it follows that the distributional consequences of the regulation are good. On this account, any regulation designed to reduce pollution would have good distributional consequences and separate distributional analysis would not be necessary. It is impossible to square this approach with the Clinton and Obama directives.

The important missing element in the analysis is the consideration of alternatives. Even though Circular A-4 makes it a centerpiece of regulatory analysis, and even though agencies, including EPA, routinely consider alternatives in assessing the costs and benefits of regulation, the consideration of alternatives has played no role whatsoever in the agency's distributional analyses analyzed above.[92] Without making the consideration of alternatives a centerpiece of such analyses, agencies will never be in a position to meaningfully compare different approaches based on their distributional attributes and thereby determine, for example, whether some compromise of net benefits is worth incurring in light of significantly better consequences for disadvantaged communities.

II. Lack of a Methodological Consensus

Having established that the Executive Branch has not provided agencies with the necessary guidance, we turn to the academic literature to draw lessons on how to perform distributional

[89] *Id.* at 7-21.
[90] *See id.*
[91] *See id.* at 7-20.
[92] *See* Regulatory Impact Analysis for the Cross-State Air Pollution Rule, *supra* note 69, at 323; Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, *supra* note 74, at 7-36; Regulatory Impact Analysis for the Clean Power Plan, *supra* note 84, at 7-21.

analysis. As part of this effort, we examine the methodologies employed by a large universe of studies that measure "disproportionate impact."[93] These methodologies can be broken out into five elements: choice of the unit of analysis, categorization of race and ethnicity, measure of socioeconomic status, assessment of the level civic engagement, and determination of disproportionate impact.[94] We show that, with respect to each of these elements, there is no consensus on how the analysis should be done, with different studies using significantly different approaches.

Section A explains how we selected the studies that form the basis for our analysis. In the subsequent sections, we discuss the various approaches the studies use for each of the five methodological elements listed above. Most of the articles included in our analysis do not explain why they make a particular choice with respect to an element. But where they do, we provide the explanation.

A. *A Meta-Analysis*

We include in our analysis only studies that perform empirical analysis to answer a research question with regards to disproportionate impacts resulting from environmental pollution. To avoid creating an authorial bias by personally selecting the articles we deemed the most important from the literature, we developed a closed universe of studies by examining all the empirical studies discussed in the 2019 peer-reviewed article *Environmental Justice: Establishing Causal Relationships* by H. Spencer Banzhaf, Lala Ma, and Christopher Timmins.[95]

The Banzhaf article argues that disparate impacts produced by pollution should be studied using econometric techniques, in order to design effective policy to eliminate such inequities.[96] To that end, the article engages in a comprehensive review of the environmental justice literature over the past 30 years,[97] which focuses mostly on the correlations between pollution and population demographics in the United States, and, in some cases, seeks to identify potential causal mechanisms driving the observed correlations.

We selected this article because it covers a broad swath of the literature in environmental justice, citing 161 reports and academic articles to highlight the major themes and developments throughout the history of the environmental justice movement, law and regulatory practice.[98] Out of this full universe, we selected for our analysis the 37 works that use quantitative research methods to analyze either pre-existing data or data the authors gathered themselves.

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[93] See the document "Disproportionate Impact Methodologies from Banzhaf, et al" for a complete record of this information (on file with the authors).

[94] This list is far from comprehensive. For example, gender is often implicated by environmental regulations due to the differential impacts on health by gender. *See* Joshua Lee, *Ecofeminism as Responsible Governance: Analyzing the Mercury Regulations as a Case Study*, 42 HARV. ENV'T L. REV. 519 (2018) (arguing that review of environmental regulations should include distributional analysis by gender). Gender is also likely implicated in a number of significant non-environmental regulatory contexts.

[95] Banzhaf et al., *supra* note 28.

[96] *See id.* at 377.

[97] *See id.* at 378.

[98] *See id.*

The studies selected examine environmental pollution of various types, including air and water pollution, both localized and dispersed. The publication dates range from 1993 to 2019. Exploring such a diverse set of studies allows us the opportunity to observe methods used by academics facing a variety of challenges, including access to appropriate data;[99] measurement issues, such as how to determine the appropriate geographic unit to measure the impact of a local source of air pollution;[100] and challenges in seeking to determine causation.[101]

For each study, we hand-coded the choice with respect to each of the five elements that form the basis for our analysis. We then grouped the choice into categories to make comparisons more tractable.

B. *Unit of Analysis*

All 37 studies investigate whether environmental outcomes are disproportionately distributed across the population. In order to make this comparison, it is necessary to divide the nation into smaller geographic units. That makes it possible, for example, to determine whether a unit with a higher proportion of people of color has more exposure to environmental harms that units with this proportion is lower.

Many studies define the unit of analysis by reference to data from the U.S. Census framework, with 19 studies (51%) using either Census block groups or Census tracts as their unit of analysis.[102] This approach is convenient because many national datasets break down information into these units. [103]

Twelve studies (32%) use census tracts as their unit of analysis. A census tract is a "small, relatively permanent statistical subdivision … of a county or equivalent entity."[104] The tract boundaries are updated before each decennial census.[105] These tracts can differ in

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[99] *See* Ed Gerrish & Sharon L. Watkins, *The Relationship Between Urban Forests and Income: A Meta-Analysis*, 170 LANDSCAPE & URB. PLAN. 293, 295 (2017) (implementing a dissimilarity index to estimate the distribution of racial groups across census tracts).

[100] *See* Jayajit Chakraborty & Marc P. Armstrong, *Exploring the Use of Buffer Analysis for the Identification of Impacted Areas in Environmental Equity Assessment*, 24 CARTOGRAPHY & GEOGRAPHIC INFO. SYS. 145, 146–47 (1997) (implementing geographic plume analysis to avoid the inaccuracy of more commonly used circular buff zones); James L. Sadd et al., *"Every Breath You Take…": The Demographics of Toxic Air Releases in Southern California*, 8 INT'L J. ENV'T RSCH. & PUB. HEALTH 1441, 1443 (2011) (proposing an "Environmental Justice Screening Method" that incorporates 23 indicator metrics to improve upon the simple use of income and race to measure relative impacts on vulnerable communities).

[101] *See, e.g.*, Seema Arora & Timothy N. Cason, *Do Community Characteristics Influence Environmental Outcomes? Evidence from the Toxics Release Inventory*, 65 S. ECON. J. 691, 693 (1999) ("Strong correlations exist between many of our explanatory variables, which creates a classic multicollinearity problem. This problem has the potential to cause incorrect statistical inferences regarding individual coefficient estimates.").

[102] Census tracts are statistical subdivisions of a county or equivalent political geographic unit, typically consisting of between 1,200 and 8,000 people. Census block groups are statistical divisions of census tracts, typically consisting of 600 to 3,000 people. *Glossary*, U.S. CENSUS BUREAU (Sep. 16, 2019) https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_13.

[103] See Brett M. Baden & Don L. Coursey, *The Locality of Waste Sites Within the City of Chicago: A Demographic, Social, and Economic Analysis*, 24 RES. & ENERGY ECON. 53, 59 (2002).

[104] U.S. CENSUS BUREAU GLOSSARY, https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_13 (last visited May 31, 2021).

[105] *Id.*

population size from 1200 to 8000 people.[106] The U.S. Census Bureau explains the tracts were designed "to provide a stable set of geographic units for the presentation of statistical data."[107]

Baden and Coursey defend the use of census tracts as a unit of analysis, citing other researchers who have shown that the tracts have "local descriptive power"[108] that other units do not because they are drawn by local committees to reflect "local ideas of homogenous neighborhoods."[109] They also note prior work has favored tracts because they are comparable in population and more likely to coincide with neighborhoods than other units, such as zip codes.[110]

Seven studies (19%) use census block groups.[111] A census block group is "a statistical division[] of census tracts ... generally defined to contain between 600 and 3,000 people."[112] Every census tract contains at least one block group.[113] These block groups typically cover a contiguous area of land, but they do not cross state, county, or census tract boundaries.[114] Some of the authors who use census block groups as the unit of analysis, cite the ease of access to large amounts of data across time as the reason they chose this unit. For example, Rosofsky et al. describe the availability of census block group data combined with their eight-year ambient air pollution data as "a unique opportunity to examine inequalities over time and develop a more nuanced understanding of whether [air pollutant] exposure inequalities are driven by demographic shifts or longitudinal pollution source distribution."[115] Liévanos suggests that the use of this same unit by prior studies makes such a choice preferable because it facilitates comparisons.[116] Ash and Fetter claim that their choice to use census block groups is a "methodological improvement" from prior analyses, which typically involved larger units, because using smaller units allows them to avoid "reaching conclusions from a large unit of analysis that [does] not hold at smaller resolution due to spatial heterogeneity."[117]

Six studies (16%) use counties for their unit of analysis. Konisky justifies this choice by reference to "constraints posed by the available EPA enforcement data."[118] Hird argues that a

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[106] *See id.*
[107] *Id.*
[108] *See* Baden & Coursey, *supra* note 103, at 59.
[109] *Id.*
[110] *See id.*
[111] Census block *groups* are distinct from census blocks. Census blocks "are statistical areas bounded by visible features, such as streets, roads, streams, and railroad tracks, and by nonvisible boundaries. . . Generally, census blocks are small in area; for example, a block in a city bounded on all sides by streets." *Id.* None of the studies in our universe used census blocks as their unit of analysis.
[112] *Id.*
[113] *See id.*
[114] *See id.*
[115] Anna Rosofsky et. al, *Temporal Trends in Air Pollution Exposure Inequality in Massachusetts*, 161 ENV'T RSCH. 76, 77 (2018)*; see also* Marc D. Shapiro, *Equity and Information: Information Regulation, Environmental Justice, and Risks from Toxic Chemicals*, 24 J. POL'Y ANALYSIS & MGM'T 373 (2005) (using a difference-in-means test to observe changes in emissions and risk over time, noting block groups were used due to the data available).
[116] *See* Raoul S. Liévanos, *Sociospatial Dimensions of Water Injustice: The Distribution of Surface Water Toxic Releases in California's Bay-Delta*, 60 SOCIO. PERSP. 575, 580 (2017).
[117] Michael Ash & T. Robert Fetter, *Who Lives on the Wrong Side of the Environmental Tracks? Evidence from the EPA's Risk-Screening Environmental Indicators Model*, 85 SOC. SCI. Q. 441, 442 (2004).
[118] David M. Konisky, *Inequities in Enforcement? Environmental Justice and Government Performance*, 28 J. POL'Y ANALYSIS & MGMT. 102, 106 (2009).

county "is both large enough to include the effects of hazardous waste sites, and small enough to record significant socioeconomic variation."[119]

Four studies (11%) use zip codes as their unit of analysis. Brooks and Sethi point out that the Census collects demographic data including race and poverty status at the zip code level.[120] The availability of this data, combined with their dataset that tracks air emissions exposure by zip code, allows the authors to pinpoint the exposure to each individual in the country, and thus the mean level of exposure for the whole United States.[121] However, their article also identifies certain challenges involved in using zip codes, particularly for an analysis of air pollution. In particular, "zip codes vary greatly in size and air emissions do not honor zip code boundaries;" thus, the authors use a "distance-weighted sum of all air emissions within some distance *s* of that zip code's centroid" to estimate air pollution within the unit of analysis.[122]

Three studies (8%) conduct their research using data at the individual household level. Binner et al. argue that their study requires an investigation at this disaggregated level in order to observe whether households choose to rent or purchase their home.[123] Collins et al. maintain that studies relying on "pre-defined geographic units" are limiting, particularly when household decision-making may play a role in the causal forces producing the inequities observed.[124]

Finally, five authors (14%) generate their own unit of analysis to accommodate their research question. For example, Gray and Shadbegian use units defined by a 50-mile radius from each polluting facility in their study to examine measures of environmental regulatory activity (inspections and enforcement actions) and levels of air and water pollution at approximately 300 U.S. pulp and paper mills.[125] In turn, Chakraborty and Armstrong use a geographic plume derived from air dispersion modeling to estimate areas and populations exposed to airborne releases of toxic substances.[126]

The results for unit of analysis are summarized in Table 1.

Table 1. Unit of Analysis

Categories	Count	Percentage
Census Tract	12	32%

[119] John A. Hird, *Environmental Policy and Equity: The Case of Superfund*, 12 J. POL'Y ANALYSIS & MGMT. 323, 331 (1993).
[120] *See* Nancy Brooks & Rajiv Sethi, *The Distribution of Pollution: Community Characteristics and Exposure to Air Toxics*, 32 J. ENV'T ECON. & MGMT. 233, 240 (1997).
[121] *See id.* at 239.
[122] *Id*. at 237.
[123] *See* Amy Binner & Brett Day, How Property Markets Determine Welfare Outcomes: An Equilibrium Sorting Model Analysis of Local Environmental Interventions, 69 ENV'T & RESOURCE ECON. RES. 733, 735 (2018).
[124] Timothy W. Collins et al., Household-Level Disparities in Cancer Risks from Vehicular Air Pollution in Miami, 10 ENV'T RSCH. LETTERS 1, 1 (2015) (examining whether statistical associations for cancer risks found for geographic units translate to relationships at the household level).
[125] *See* Wayne B. Gray & Ronald J. Shadbegian, *Optimal Pollution Abatement: Whose Benefits Matter and How Much?*, 47 J. ENV'T ECON. MGMT. 510 (2004).
[126] *See* Chakraborty & Armstrong, *supra*, note 100.

Census Block Group	7	19%
County	6	16%
Zip Code	4	11%
Household	3	8%
Other	5	14%

C. *Race and Ethnicity*

Thirty-one of the 37 studies in our sample analyze the impact of pollution on racial or ethnic groups. The methods for describing race and ethnicity vary widely in detail, but most studies describe the characteristics of their units of analysis in one of two main ways.

One method, used by 15 of the studies (48%), breaks down the racial composition of observed population. Eleven of these studies (35%) use disaggregated data for each of the relevant groups. For example, Clark, et al. break down the population into the seven racial categories used by the U.S. Census Bureau.[127]

In contrast, four studies (13%) aggregate non-Whites in various ways. For example, although Arora and Cason report the full racial breakdown of the population observed, the authors aggregate all non-White[128] residents both in their analysis and in the discussion of their results.[129] By contrast, Baden and Coursey aggregate non-White, non-Black individuals in each unit of analysis, leaving both Black and White reference groups.[130] Similarly, Voorheis aggregates those non-White racial groups for which "sample sizes are prohibitively small" but retains White, Hispanic and Black as separate racial categories.[131]

The disaggregated studies seek to add nuance to their analysis. For example, Ash and Fetter, which include Hispanics, non-Hispanic Blacks and non-Hispanic Asian and Pacific Islanders as separate categories, explain that although studies often group together various racial and ethnic minorities, analyzing different minority categories separately allows them to identify different patterns of exposure for these groups.[132]

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[127] The seven categories are "White alone, Black or African American alone, Asian alone, Native Hawaiian or other Pacific Islander alone, American Indian or Alaska Native alone, other race alone, two or more races." Lara P. Clark et al., *Changes in Transportation-Related Air Pollution Exposures by Race-Ethnicity and Socioeconomic Status: Outdoor Nitrogen Dioxide in the United States in 2000 and 2010*, 125 ENV'T HEALTH PERSPECTIVES 1, 2 (2017).
[128] Throughout this Part, we refer to racial categories using the terminology of each respective author. Where referring to categories across studies, we use the terms White, Black, Hispanic, and Asian and Pacific Islander (AAPI).
[129] *See* Arora & Cason, *supra*, note 101, at 692 ("Our results indicate that a larger percentage of non-White residents may be associated with a higher level of releases").
[130] *See* Baden & Coursey, *supra* note 103, at 71.
[131] *See* John Voorheis, *Air Quality, Human Capital Formation and the Long-term Effects of Environmental Inequality at Birth* 19 (U.S. Census Bureau, Working Paper No. 2017-05, 2017).
[132] *See* Ash & Fetter, *supra* note 117, at 446.

The second method, used by ten of the studies (32%), categorizes communities as "minority" or "people of color" if the unit of analysis is composed of a certain threshold proportion of non-White residents, again using the U.S. Census Bureau's racial categories.[133] These thresholds vary widely. For example, Hird uses a threshold of 11.89% to identify units where the proportion of racial minorities exceeds the national mean from his dataset.[134] Chakraborty and Armstrong use a threshold of 20–25% depending on the buffer delineation method. Not all studies identify a particular threshold—for example, Ringquist defines "minority neighborhoods" as those with an undisclosed percentage of non-White residents.[135]

We divided the second category into two subcategories. The first subcategory is composed of six studies (19%) that simply identify the percentage of non-White residents in the aggregate. For example, Chakraborty and Armstrong measure race by introducing a variable of "non-Whites" that identifies the percentage of residents in each unit who identify as one of the non-White census categories. [136] The authors then refer to units as non-White if the percentage is above a pre-determined threshold.[137]

The four studies in the second subcategory (13%) disaggregate the non-White populations into specific racial or ethnic groups. However, both Spina and Koniski only include the percentage of Blacks and Hispanics in each unit of analysis.[138] Brooks and Sethi track the percentage of each unit of analysis that is Black, Asian, and Native American.[139] Finally, although Been uses the phrase "people of color" or "communities of color" throughout her article, her data tracks only the percentage of Black population in a community.[140] Been uses a threshold of 50%, or the majority, referring to these units as "predominantly African American neighborhoods."[141]

The remaining six studies (19%) categorized as "Other" in Table 2 use some combination or variation on the main methods. For example, Wolch et al. create a set of mutually exclusive racial categories based on data from the 2000 census to characterize each unit of analysis by the race with the largest share of the total population in that unit.[142] Those units are then further distinguished by whether the dominant group constitutes fewer than 50%, 50% to 75% or more than 75% of the total population in that unit.[143]

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[133] *See* Chakraborty & Armstrong, *supra* note 100, at 152; *see also* John A. Hird & Michael Reese, *The Distribution of Environmental Quality: An Empirical Analysis*, 79 SOC. SCI. Q. 693, 700 (1998).
[134] *See* Hird, *supra* note 119, at 334.
[135] Evan J. Ringquist, *Equity and Distribution of Environmental Risk: The Case of TRI Facilities*, 78 SOC. SCI. Q. 811, 816 (1997).
[136] Chakraborty & Armstrong, *supra* note 100, at 152–53.
[137] *See id.*
[138] *See* Francesca Spina, *Environmental Justice and Patterns of State Inspections*, 96 SOC. SCI. Q. 417, 421 (2015); Konisky, *supra*, note 118, at 111.
[139] *See* Brooks, *supra* note 120, at 241.
[140] *See* Vicki Been, *Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?*, 103 YALE L. J. 1383, 1407 (1994).
[141] *See id.* at 1394–95.
[142] See Jennifer Wolch et al., *Parks and Park Funding in Los Angeles: An Equity-Mapping Analysis*, 26 URB. GEOGRAPHY 4, 15 (2005).
[143] *See id.*

The biggest outlier in defining race is the Sadd et al. study, which refers to disadvantaged communities as "minority urban areas."[144] The authors observe 11 characteristics: percentage of Black and Hispanic residents in the census tract; tract values of mean per capita income; median household income; median house value (self-reported); median contract rent; percentage residents employed in manufacturing; percentage of tract used for residential or industrial land; and population density.[145] Sadd finds that hazardous releases are more likely to occur in areas "in which the percentage of African American or Latino residents exceeds the area mean."[146]

The results for race and ethnicity are summarized in Table 2.

Table 2. Race and Ethnicity		
Categories	**Count**	**Percent**
Comprehensive Racial Breakdown	**15**	**48%**
Aggregated	4	13%
Disaggregated	11	35%
Binary Approach	**10**	**32%**
Aggregated	6	19%
Disaggregated	4	13%
Other	**6**	**19%**

D. *Socioeconomic Status*

Twenty-nine of the 37 studies use socioeconomic status as an element in their examination of distributional consequences. Most authors' measures for socioeconomic status are composed of multiple data points. The approaches mostly fall into three major categories: six studies (21%) use median household income to categorize each unit of analysis; seven studies (24%) use the federal poverty rate or a similar measure of poverty; and thirteen studies (45%) use multiple variables to determine socioeconomic status. The remaining three studies (10%) are categorized as "other."

Studies in the first category identify certain communities as lower- or higher-income simply based upon the median household income within that unit of analysis. For example, Rosofsky et al. use income data collected from the American Community Survey to define

[144] *See* Sadd, *supra* note 100, at 108.
[145] *See id.* at 110.
[146] *Id.* at 111.

income groups as those below $20,000 per year, between $20,000 to $35,000 per year, between $35,000 to $50,000 per year, between $50,000 and $75,000 per year, and those above $75,000 per year.[147]

Studies in the second category use the poverty rate in a similar way, to identify certain communities as lower-income and thus disadvantaged. Some of these studies simply identify communities below the poverty line using the U.S. Census definition of poverty, which is a function of household size.[148] Morello-Frosch and Jesdale use the poverty level for a four-person household, which at the time was $12,647.[149] Su et al. instead define poverty as being below 200% of the federal poverty level, "because on average, families need an income equal to about two times the federal poverty level to meet their most basic needs."[150] Banzhaf and Walsh divide communities into "low" and "high" income with a custom "boundary income."[151]

The third approach combines median household income with a variety of other variables to present a more nuanced account of socioeconomic status. For example, Hird defines low socioeconomic status based on a formula that, in addition to median household income, takes into account both the percentage of county residents below the federal poverty level and the unemployment rate.[152] In contrast, Casey et al. do the categorization based on an even broader set of additional variables: "low educational attainment," defined as the percent of adults age 25 years or older without a completed high-school education; "poverty," defined as percent of individuals with income below the U.S. Census Bureau poverty threshold based on family size; and "civilian family unemployment," defined as the percentage of families with one or more unemployed member; the percentage of renters; and "linguistic isolation," defined as the percentage of households in which nobody aged 14 or older speaks English "very well."[153] Defending a broader account of socioeconomic of this sort, Bowen points out that "median household income and the poverty rate, though related, are distinguishable as measures of economic status" because "[s]ome working-class neighborhoods reporting, for example, relatively low incomes but high employment rates may have relatively low poverty rates."[154]

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[147] Anna Rosofsy et. al, *Temporal Trends in Air Pollution Exposure Inequality in Massachusetts*, 161 ENV'T RSCH. 76, 77 (2018).

[148] *Poverty Thresholds*, U.S. CENSUS BUREAU (last updated Feb. 2, 2021), https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html [https://perma.cc/JU9R-DSU5]. Not all the studies indicate the household size used for the categorization. *See, e.g.*, Chakraborty & Armstrong, *supra*, note 100, at 153; Warren Kriesel et al., *Neighborhood Exposure to Toxic Releases: Are There Racial Inequities?*, 27 GROWTH & CHANGE 479, n. 7 (1996) (using the poverty rate in each census block group to identify "predominantly poor" populations).

[149] *See* Rachel Morello-Frosch & Bill M. Jesdale, *Separate and Unequal: Residential Segregation and Estimated Cancer Risks Associated with Ambient Air Toxics in U.S. Metropolitan Areas*, 114 ENV'T HEALTH PERSP. 386, 389 (2006).

[150] Jason G. Su et al., *Inequalities in Cumulative Environmental Burdens Among Three Urbanized Counties in California*, 40 ENV'T INT'L 79, 80 (2012).

[151] H. Spencer Banzhaf & Randall P. Walsh, *Segregation and Tiebout Sorting: The Link Between Place-Based Investments and Neighborhood Tipping*, 74 J. URB. ECON. 83, 85 (2013).

[152] *See* Hird, *supra* note 119, at 335*; see also* Ann Wolverton, *Effects of Socio-Economic and Input-Related Factors on Polluting Plants' Location Decisions*, 9 B.E. J. ECON. ANALYSIS & POL'Y 14, 25 (2009).

[153] Joan A. Casey et al., *Race/Ethnicity, Socioeconomic Status, Residential Segregation, and Spatial Variation in Noise Exposure in the Contiguous United States*, 125 ENV'T HEALTH PERSP. 1, 3 (2017).

[154] William M. Bowen et al., *Toward Environmental Justice: Spatial Equity in Ohio and Cleveland*, 85 ANNALS ASS'N AM. GEOGRAPHY 641, 647 (1995).

One example in "other category" is Gerrish and Watkins, which determines socioeconomic status based on the ratio of income of the wealthiest five percent of households to income of the poorest 20 percent of households. The authors generated a binary indicator that equals one if a city's 95/20 ratio is higher than 9.7—the aggregate ratio for the 100 largest metro areas in 2014 – and zero if it is lower.[155]

The various approaches to determining socioeconomic status are summarized in Table 3.

Table 3. Socioeconomic Status		
Categories	**Count**	**Percent**
Median Household Income	6	21%
Poverty Rate	7	24%
Multiple Variables	13	45%
Other	3	10%

E. *Civic Engagement*

Nine of the 37 studies consider some measure of civic engagement,[156] which the studies refer to as "political empowerment,"[157] "political mobilization,"[158] or "propensity [for] collective action."[159] The authors of several of these studies indicate that they chose to track civic engagement in addition to other demographic variables because of the "implications for land-use decision making, transportation planning, and regulatory activities" that political power may have in the region in question.[160] Typically, the inclusion of this element appears to be as a statistical control to strengthen the validity of any causal claims made with regards to race, socioeconomic status or any other household characteristic of interest.[161] Several of the studies, however, acknowledge that political power is likely a product of some characteristics, particularly education level, that are causally linked to socioeconomic status.[162]

The measures for civic engagement largely fall into one of three categories: some measure of voter turnout; some measure of education level; and some measure of housing type. Those studies that use more than one of these measures are categorized in a "hybrid" category.

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[155] *See id.*
[156] Throughout this Section, we will use "civic engagement" to capture this concept. Morello-Frosch, *supra* note 149, also uses this term.
[157] Pamela Davidson & Douglas L. Anderton, *Demographics of Dumping II: A National Environmental Equity Survey and the Distribution of Hazardous Materials Handlers*, 37 DEMOGRAPHY 461, 463 (2000).
[158] Hird, *supra* note 119, at 332; Hird & Reese, *supra* note 133, at 693.
[159] Brooks, *supra* note 120, at 234.
[160] *Id.*
[161] *See, e.g,.* Collins, *supra* note 124, at 4 ("Explanatory variables were selected to test alternative theoretical explanations for inequitable exposure to HAPs").
[162] *See, e.g.,* Hird & Reese, *supra* note 133, at 701 ("better-educated communities and those where more people own their homes and vote are more likely to mobilize, and to be more effective if they do mobilize, than other regions, and are therefore more likely, ceteris paribus, to live in regions with lower pollution levels").

As a proxy for civic engagement, two studies (22%) use voter turnout,[163] for which there is easily accessible and comprehensive data in the form of the state or county voter rolls. For example, Brooks and Sethi explain that voter turnout is "a much better proxy for collective action participation than an actual measure of community involvement in, for instance, environmental organizing since it is more likely to be exogenous."[164] By contrast, they suggest that local environmental organizing may be correlated with existing pollutant exposure, thus confounding any search for causation.[165]

Four studies (44%) use education level as a proxy for civic engagement. Davidson and Anderton measure the percentage of residents above 18 without a high-school diploma and the percentage with at least one year of college education to determine "community political empowerment."[166] Rosofsky et al. use education attainment data from the Census Bureau's American Community Survey to define "low-education" individuals as those younger than 25 years old who have less than a high school degree.[167] Shapiro uses education level to determine a community's "ability to overcome informational barriers."[168] He identifies the percentage of the observed population that has only a grade-school diploma and those that have a college degree.[169] Liévanos uses census data to identify households that are "linguistically isolated," or in which "all members 14 years old and over speak a non-English language and also speak English less than 'very well.'"[170]

One study (11%), by Collins et al., uses housing type as to measure civic engagement.[171] It focuses on the percentage of renter-occupied housing because this status reflects greater housing instability as well as less political engagement and access to resources.[172]

Finally, two studies (22%) use a hybrid approach, combining with one or both of voter turnout and education level. Hird identifies the percentage of residents who are homeowners along with the percentage who are college educated, and the percentage who lived in the same county for more than a decade in order to identify counties that have a "stable, and presumably more politically motivated, citizenry."[173] Hird and Reese combines the percentage of owner-

[163] *See* Brooks, *supra* note 120, at 243 ("proportion of the voting age population that voted in the last presidential election. This is used as a proxy for the propensity of the community to participate in collective action."); Morello-Frosch, *supra* note 149, at 389.
[164] Brooks, *supra* note 120, at 243.
[165] *See id.*
[166] Davidson & Anderton, *supra* note 157, at 463. While the authors use this variable to explain the likelihood of a waste site, they also explain its limitation, acknowledging that "lower average levels of education . . . may simply reflect the presence of industrially employed residents living near places of employment." *Id.* Thus, instead of explaining the location of waste sites, this variable may be caused by such sites.
[167] Rosofsky, *supra* note 115, at 77.
[168] Shapiro, *supra* note 115, at 379–80.
[169] *See id.* at 385.
[170] Liévanos, *supra* note 116, at 586.
[171] Collins, *supra* note 124.
[172] *See id.* at 5.
[173] Hird, *supra* note 119, at 336.

occupied homes, with the percentage of residents with more than 12 years of education, and the percent of residents who voted in the previous presidential election.[174]

The results for civic engagement are summarized in Table 4.

Table 4. Civic Engagement		
Categories	**Count**	**Percent**
Voter Turnout	2	22%
Education Level	4	44%
Housing Type	1	11%
Multiple Variables	2	22%

F. *Defining Disproportionate Impact*

Disproportionate impact describes whether a disadvantaged population, in terms of race and ethnicity, socioeconomic status, or civic engagement, is more likely to be exposed to greater pollution. The 37 studies primarily use one of three major approaches. The majority, twenty-four (65%) define disproportion as some inequity among units of analysis with regards to the exposure to the pollution in question. Four (8%) of the studies consider proximity to local pollution to define disproportion. Finally, six (16%) of the studies defined disproportionate impact as inequity with some *causal* element.

The majority category defines disproportion in terms of an observed pattern of inequity. For example, Chakraborty and Armstrong's paper define disproportion simply as a statistically significantly greater exposure to toxic releases.[175] In these studies, a finding of *correlation* between disproportion and some other element, such as race or socioeconomic status, is considered an injustice to be remedied, regardless of might have caused the pattern.[176]

The second category focuses on physical proximity to polluting sources rather than on exposure levels. For example, Sadd et al. define disproportion as "a pattern of disproportionate proximity to hazards," which results in an inequitable distribution of perceptions of risk.[177]

The third category is determined by reference to causation: whether the disproportionate impact is the result of racial or socioeconomic characteristics. For example, Baden and Coursey argue that studies of disproportion should include a temporal element to determine whether contextual dynamics may confound an observed correlation. The study examines the history of industry, environment, and race in Chicago and discovers that although Chicago's South Side, a predominantly Black region, has many hazardous waste sites, that siting largely pre-dates the

[174] *See* Hird & Reese, *supra* note 133, at 701.
[175] *See* Chakraborty & Armstrong, *supra* note 100, at 145.
[176] *See* Kriesel, *supra* note 148, at 481 ("a statistical finding of aversive racism is that greater exposure to environmental risk is correlated with higher populations of racial minorities").
[177] Sadd, *supra* note 100, at 110.

shift in local demographics from a predominantly industrial, White region to a predominantly Black one.[178]

Finally, four studies do not fall into one of these first three categories. For example, in Hird has a hybrid approach that looks at both disproportionate risk and proximity to Superfund sites. Sadd et al. also takes into account multiple variables: hazard proximity and land use, air pollution exposure and its estimated health risk, and social and health vulnerability.

The results for disproportionate impact are summarized in Table 5.

Table 5. Disproportionate Impact

Categories	Count	Percent
Non-causal inequity	24	65%
Proximity	4	8%
Causal	6	16%
Other[179]	4	11%

The variety of methodologies employed for each of the variables discussed in this Part demonstrates that the there is no consensus among academic researchers on how to perform this type of analysis. Moreover, few of the studies explain the reasons for the various choices. There is therefore significant risk that researchers can pick and choose from the methodological elements to reach predetermined results. To reduce this risk, in Part III we set forth considerations that should guide some of the methodological choices.

III: STANDARDIZATION

In an October 2020 report, Jason Schwartz argues that OIRA should convene an interagency working group in order to, among other things, design "[a] standardized methodology, including *common definitions of subgroups* to focus on and *metrics for quantification*, [to] help make different agencies' distributional analyses interoperable."[180] "Interoperability," or the ability to compare and make use of the information across reviews of different regulations, is a key value identified in Circular A-4, which in addition to specifically calling for agencies to compare regulatory alternatives in a given regulatory impact analysis,[181] is ultimately designed to standardize regulatory review practices.[182] Without such comparison, it

[178] *See id.* at 61–67.
[179] We place Su et al.'s study in this category because it uses a quantitative summary of inequality among groups, in which 0 indicates that all groups, or in this case all census tracts, have an equal share of environmental burden (i.e., there is no inequality), and 1 is the highest level of inequality, where one group or one census tract bears the whole detrimental burden. Su et al., *supra* note 150, at 81.
[180] Jason Schwartz, Inst. for Pol'y Integrity, Enhancing the Social Benefits of Regulatory Review 12 (2020).
[181] Circular A-4, *supra* note 12, at 2.
[182] *See id.* at 1 ("This Circular is designed [to standardize] the way benefits and costs of Federal regulatory actions are measured and reported").

would be impossible to determine when the distributional impacts of one regulation are troubling, or how to compare negative distributional impacts across different rules.

Standardizing an approach to distributional analysis does not mean that all studies should be conducted in identical ways. For example, as we discuss below, there might be reasons, for example, for using larger units of analysis for some environmental problems and smaller ones for others. But explanations should be provided for the different choices, which, as Part II shows, has generally not been the case in the existing studies.[183]

Developing a fully specified standardized approach for performing distributional analysis is beyond the scope of this Article. Such a task, to be viewed as legitimate, would require robust stakeholder input.[184] For example, stakeholders are likely to have important views on how to define the communities affected by particular environmental harms.

Nonetheless, in this Part we seek to start the conversation that would ultimately result in such standardization and could eventually be embodied in a revision of Circular A-4, which, in its current form, does not provide meaningful guidance on how to conduct distributional analyses.[185] We focus on three of the methodological elements discussed in the studies analyzed in Part II: unit of analysis, race and ethnicity, and socioeconomic status.[186] We analyze the choices concerning these elements in those studies as well as in the broader literature.

A. *Unit of Analysis*

With respect to the unit of analysis, twelve of the studies (32%) analyzed in Part II use census tracts as their unit of analysis, seven (19%) used census block groups, six (16%) used counties, four (11%) use zip codes, and three (8%) used individual households.[187] As noted above, the studies do not typically explain the reason for their methodological choices. However, these choices have significant consequences.

Indeed, the selection of unit of analysis can be critically influential on reported outcomes.[188] A recent study examines these consequences "for the issue of energy use inequality in cities."[189] The authors find that their results vary significantly depending on the unit of

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[183] *See supra* text accompanying notes 93–95.

[184] Schwartz, *supra* note 180, at 12; Inst. for Pol'y Integrity, Comment Letter on Avenues to Promote Equity and Advance Environmental Justice Through Rulemaking and Regulatory Analysis 27 (July 6, 2021), https://policyintegrity.org/documents/Comments_on_Advancing_Equity_and_Supporting_Underserved_Communities.pdf.

[185] *See supra* text accompanying notes 39–44.

[186] As noted above, this Article does not address a comprehensive list of the elements that an updated Circular A-4 should encompass. Other important elements to consider include, for example, gender and age. *See supra* text accompanying note 94.

[187] *See supra* text accompanying notes 102–126.

[188] *See* Rae Zimmerman, *Issues of Classification in Environmental Equity: How We Manage Is How We Measure*, 21 FORDHAM URB. L. J. 633, 645–54 (1994).

[189] Rachel Nuwer, *Study Shows How Cities Can Consider Race and Income in Household Energy Efficiency Programs*, PRINCETON SCHOOL OF ENGINEERING AND APPLIED SCIENCE (June 7, 2021) https://engineering.princeton.edu/news/2021/06/07/study-shows-how-cities-can-consider-race-and-income-household-energy-efficiency; *see also* Tong et al., *Measuring Social Equity in Urban Energy Use and Interventions Using Fine-Scale Data*, 118 PROCEEDINGS OF THE NAT'L ACADEMY OF SCIENCES 1 (June 15, 2021).

analysis applied to measure inequality, like city blocks, census block groups, census tracts and zip codes.[190] Specifically, the authors find that when the data is aggregated, their metric of inequality decreases by up to 50%.[191] In other words, in larger units of analysis, they are less able find inequality.

This problem is not new to researchers who study inequality. In 1997, Vicki Been wrote that, "[t]here is a great deal of controversy about whether census tracts, smaller census units like block groups, larger zip code areas, or concentric circles of various radii are the preferred unit of analysis for environmental justice studies."[192] Been went on to explain her selection of census tracts for the purpose of her study, which employs a longitudinal analysis of waste facility siting in order to determine what caused these facilities to end up in host communities with a disproportionate population of poor and minority residents.[193] Her article set forth four variables as key to the decision on the appropriate level of granularity: cost, consistency over time, comparative use, and how communities self-identify.[194]

Regarding cost, Been found that census tracts are preferable because federal agencies already collect many demographic and other important data at the tract level. In contrast, the use of concentric circles produced by Geographic Information System (GIS) technology can be prohibitively expensive. Zip codes can create similar barriers if the available data does not exist at that level of granularity. Generally, whenever data is not available at the level of granularity of the chosen unit of analysis, costly procedures would be required to conform the data to such a unit.[195]

As to the second variable, Been noted that ensuring that the unit of analysis is consistent over time is critical for any analysis that seeks to track changes over time. While GIS circles are the most consistent unit over time, they are prohibitively expensive to use for large-scale studies.[196] Been considers census tracts superior to zip codes for consistency because "[t]racts are intended to remain relatively stable over time. When they change, the exact nature of the change is published" whereas "[z]ip code boundaries … frequently are changed for the convenience of the postal service, and no published record is available to document changes."[197]

Zip codes are problematic from the perspective of the third variable: comparative value. Unlike the census-drawn boundaries including tracts, blocks, and block groups, zip codes

[190] *See id.*
[191] *See* Tong et al., *supra* note 189, at 5.
[192] Vicki Been, *Coming to the Nuisance or Going to the Barrios? A Longitudinal Analysis of Environmental Justice Claims*, 24 ECOLOGY L.Q. 1, 10 (1997).
[193] *See id.* at 7–8.
[194] Baden & Coursey, *supra* note 103, at 59, refer to this element as "local descriptive power."
[195] *See* Been, *supra* note 192, at 11 ("converting census data into GIS units involves making various assumptions about how the population within a census tract bisected by a GIS circle is distributed, and those assumptions are controversial").
[196] *Id.* at 11.
[197] *Id*.

"contain widely different numbers of people, and cover vastly different land areas."[198] Similarly, GIS circles,[199] although uniform in size and shape, can vary in population and type of land.

With respect to the fourth variable, a community's perception of itself, Been argued that census tracts are superior because they are "set by local committees charged with reflecting exactly the kind of community sentiments and practices" a unit of analysis should capture.[200] Similarly, Paul Mohai noted that a community's view of its boundaries, including "areas whose needs leaders feel they are addressing and which have a self-identity and common stake" can be important in identifying units based on how future ameliorative action will proceed.[201]

For all empirical studies of the distributional consequences of pollution, a significant challenge is how best to match the unit of analysis to the physical nature of the problem.[202] Selecting a unit that is too large can lead to conclusions that do not remain valid in analyses of smaller, sub-units.[203] The same is true in reverse: drilling down to units that are too small can allow analysts to miss important patterns across a broader community.[204] For example, if the negative impacts of a hazardous waste site are confined to a 1000-foot radius, using a mile radius as the unit of analysis might mix together a small number of affected individuals with a large number who are not affected, thereby diluting the negative impact attributed to the hazardous waste site. Indeed, in this hypothetical scenario, it is quite likely that a statistically disproportionate impact found within a 1000-foot radius would be so diluted within a mile radius as to no longer be statistically significant. As a result, in comments submitted to the Office of Management and Budget (OMB) on its Request for Information on Methods and Leading Practices for Advancing Equity and Support for Underserved Communities Through Government, the Institute for Policy Integrity argues for granularity in selection of unit of analysis.[205] It observes that "group averages often mask disparate effects across communities and fail to accurately capture total regulatory impacts," and that, to address this problem, "regulators should measure effects as granularly as possible."[206]

But conversely, if the effects are felt for a mile, using a 1000-foot radius might result in a sample that is so small that it would fail to reveal a statistically disproportionate impact.[207] The key, therefore, is to ensure that the unit of analysis is related to the physical nature of the problem and to how pollution causes damage.[208]

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[198] *Id.* at 12*; see also* Brooks, *supra* note 120, at 240.
[199] For an example of a distance-based study, see Paul Mohai & Robin Saha, *Which Came First, People or Pollution? Assessing the Disparate Siting and Post-Siting Demographic Change Hypotheses of Environmental Justice*, 10 ENV'T RSCH. LETTERS 1, 2 (2015).
[200] *See* Been, *supra* note 192, at 11–12; *see also* Baden & Coursey, *supra* note 103, at 59 (noting the "local descriptive power" of census tracts).
[201] Mohai, *supra* note 203, at 639*; see also id*. at 12.
[202] *See* Zimmerman, *supra* note 188, at 645–54.
[203] Paul Mohai, *The Demographics of Dumping Revisited: Examining the Impact of Alternate Methodologies in Environmental Justice Research*, 14 VA. ENV'T. L.J. 615, 619 (1995).
[204] *See* Been, *supra* note 140, at 1402 ("Although a facility may have its most immediate impact on the few blocks immediately contiguous to the facility, there is substantial reason to doubt that the impact stops there").
[205] *See* Comment Letter, *supra* note 184.
[206] *Id.* at 9.
[207] *See* Ash & Fetter, *supra* note 132, at 442.
[208] *See* Been, *supra* note 140, at 1402; *see also* Been, *supra* note 192, at 11.

In the case of air pollution, the problem is further complicated by the presence of prevailing winds. As a result, areas downwind of a source are the ones that are primarily affected by a plant's emissions, and upwind areas are not subject to similarly serious impacts. The use of a radius around the source would aggregate affected areas with generally unaffected areas.[209] If there were statistically significant distributional impacts in the affected areas, the significance might disappear if unaffected areas are aggregated in the unit of analysis. As a result, the ideal approach to this problem is for the unit of analysis to follow the pollution plume, as it travels downwind from the source, with the negative impacts often felt for hundreds of miles.**[210]**

Nonetheless, using the unit that best comports with the physical characteristics of the environmental problem might be infeasible because of the lack of available data. For example, data might not be available for very small units. For example, "where a block is so small that the confidentiality of the census survey respondents would be compromised by release of the data, the Census Bureau suppresses the data."[211] In other cases, the unit of analysis that best comports with the physical consequences of the pollution may not be available because it might not correspond to any of the units—e.g., census blocks, census tracts, counties—for which data is routinely collected.[212] And, while units could be customized, the costs might be too high for this approach to be viable.[213]

When revising Circular A-4, OMB should consider these challenges in fashioning its guidance on how agencies should choose a unit of analysis for determining the distributional impacts of environmental policy. This discussion underscores that a one-size-fits-all approach is unlikely to be the answer. But, on the other hand, too much discretion would defeat the goal of making meaningful comparisons across policies and would make the analysis open to manipulation by analysts interested in hiding the negative distributional consequences of government policies. Because one of the important considerations is how a community defines itself,[214] robust stakeholder engagement is essential.

B. *Race and Ethnicity*

The observed study universe revealed three important choices in the analysis of race and ethnicity: whether to report all racial categories individually, to use a binary White v. Non-White framework, or to aggregate some but not all of the non-White categories, like Black and Native Americans. The studies discussed in Part II use each of these approaches.

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[209] *See* Chakraborty & Armstrong, *supra* note 100, at 146–47.
[210] *See* Davenport, *supra* note 65 (93% of the air pollution in parts of Connecticut originated in upwind states).
[211] *Id.*
[212] Despite his admission that county-level analysis causes a number of issues, Konisky justifies his use of counties for a study of state enforcement by reference to "constraints posed by the available EPA enforcement data." David M. Konisky, *Inequities in Enforcement? Environmental Justice and Government Performance*, 28 J. POL'Y ANALYSIS & MGMT. 102, 106 (2009).
[213] *See supra* text accompanying note 195.
[214] *See supra* text accompanying notes 200–201.

The race and ethnicity categorizations in the study universe are almost all based upon census data.[215] The U.S. Census Bureau uses racial classifications pursuant to an OMB directive,[216] which outlines the standards for the collection and presentation of race data across the federal government.[217] Specifically, OMB requires the Bureau and other federal agencies to use a minimum of five racial categories: White, Black or African American, American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander.[218] The Census Bureau also includes a sixth category on its surveys: Some Other Race.[219] The data is collected based on self-reporting, and are thus meant to reflect *social* categories rather than "explicitly biological and/or genetic contexts."[220]

In addition to defining racial categories, [221] an important challenge in the analysis of race is to determine whether, and if so how to aggregate data. Ash and Fetter point out that studies often group together racial and ethnic minority populations in analysis.[222] As with a unit of analysis that is too small or too large, aggregating racial minority groups can lead to results that mask underlying inequality. For example, Ash and Fetter find that analyzing racial categories separately allow them to identify important nuance, including that across all U.S. cities, neighborhoods with more Black residents experienced higher air pollution than neighborhoods that are predominantly White *or* predominantly Hispanic.[223]

In this connection, consider a hypothetical study that, like Ash and Fetter, collects data for Whites, Blacks, and Hispanics. A disaggregated approach would find, as they did, that the Black residents are disproportionately affected as compared to *both* White and Hispanic residents. But if Blacks and Hispanics were aggregated into a non-White category, the lack of disproportionate impact on Hispanics might counteract the disproportionate impact on Blacks, thereby making the

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[215] Twenty-eight of the thirty-one studies that analyzed race directly attributed their demographic data to the U.S. Census Bureau. One of the three that does not is Jenkins et al., which relied upon the United Church of Christ Commission for Racial Justice study, which itself attributes its demographic data to the U.S. Census Bureau. *See* Robert D. Bullard et al., *Toxic Wastes and Race at Twenty 1987–2007*, UNITED CHURCH OF CHRIST (2007).

[216] *See* Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity, *supra* note .

[217] *Race*, U.S. Census Bureau (last visited July 14, 2021) https://www.census.gov/quickfacts/fact/note/US/RHI625219#:~:text=OMB%20requires%20that%20race%20data,report%20more%20than%20one%20race.

[218] *About Race*, U.S. CENSUS BUREAU (last updated Oct. 16, 2020) https://www.census.gov/topics/population/race/about.html.

[219] *See* Race, *supra* note 217.

[220] Jonathan Kahn, *Harmonizing Race: Competing Regulatory Paradigms of Racial Categorization in International Drug Development*, 5 SANTA CLARA J. INT'L L. 34, 47 (2006).

[221] There are significant consequences to using inconsistent classifications. For example, one study found that significant instances of inconsistent classifications of Native Americans resulted in as much as a 68% difference in measures of Native American injury rates in Oregon. *See* Zimmerman, *supra*, note 188, at 641–42. Even if researchers uniformly use the data collected by the Census Bureau, the federal race categories are not uncontroversial. *See* Kori Hale, *Being Undercounted in the U.S. Census Costs Minority Communities Millions of Dollars*, FORBES (Mar. 24, 2020) (arguing that minority groups are undercounted), https://www.forbes.com/sites/korihale/2020/03/24/being-undercounted-in-the-us-census-costs-minority-communities-millions-of-dollars/?sh=18b02f5a3aa0. In this connection, OMB should consider reviewing the standards for collection of race data, which have not been updated since 1997. *See* Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity, Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity, 62 Fed. Reg. 58,782 (Oct. 30, 1997).

[222] *See* Ash & Fetter, *supra* note 132, at 442.

[223] *See id.*

White and non-White categories statistically indistinguishable. This discussion suggests that a disaggregated rather than binary approach to racial categories is superior.

But, as discussed for the choice of unit of analysis,[224] slicing the data too thinly might be problematic as well. It could be, for example, that disproportionate impacts on certain non-White groups might not be statistically significant when looked at from the perspective of individual groups, but might become statistically significant, as a result of the larger sample size, when the non-White groups are aggregated. As a result, a desirable protocol might suggest that when impacts of this sort are observed, the groups for which the impacts are disproportionate but not statistically significant should be aggregated to determine whether the aggregation leads to statistically significant results.

Moreover, this discussion underscores why distributional results should be carefully scrutinized. For example, advocates of a policy with bad distributional consequences could either aggregate or disaggregate different race and ethnicity categories to mask negative distributional consequences.

C. *Socioeconomic Status*

The universe of studies discussed in Part II take a variety of approaches to defining socioeconomic status, with the most common being use of some measure of poverty, household income, or a combination of the two. [225] However, some studies integrate other information beyond simply measures of income, including level of education, form of housing, and employment. [226]

Socioeconomic status is the one element of distributional analysis for which the federal government has a precedent to rely upon because tax regulations as well as tax legislation are subject to distributional analysis, although the analysis typically does not involve characteristics beyond income.[227] The Joint Committee on Taxation, the Internal Revenue Service's Statistics of Income Division, the Treasury Department's Office of Tax Analysis, and the Congressional Budget Office all perform distributional analyses based upon a measure of pretax income, typically dividing taxpayers into income-band ranges such as deciles or quintiles.[228] This type of analysis allows agencies to observe how the tax burden is distributed across income groups in the population. The Treasury Department's Office of Tax Analysis uses income deciles.[229] As compared to quintiles, deciles allow for the analysis of more disaggregated information, which, as discussed above,[230] is generally desirable. Given the precedent, it seems desirable for distributional analysis of regulations to use deciles when it relies on income as the measure of socioeconomic status.

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[224] *See supra* text accompanying notes 202–208.
[225] *See supra* text accompanying notes 147–155.
[226] *See supra* text accompanying notes 152–154.
[227] *See* Wallace, *supra* note 8, at 501.
[228] *See id.*
[229] *See* Office of Tax Analysis, U.S. Dep't of the Treasury, Distribution of Families, Cash Income, and Federal Taxes Under 2019 Current Law (2018).
[230] *See supra* text accompanying notes 205–206.

But variables beyond income, particularly education and wealth, are relevant measures of socioeconomic status. Several of the studies discussed in Part II use education at least as a partial determinant of such status, for example incorporating "low educational attainment," or the percent of adults age 25 years or older without a completed high-school education, into their measure for socioeconomic status.[231] Education is also viewed as a key metric for socioeconomic status, as it is not simply reflective of past opportunities, but may also limit or expand economic opportunities in an individual's future.[232] But there is no consensus on the appropriate way to determine educational attainment, or more importantly on how to aggregate it, if at all, with income or other measures of socioeconomic status.

While wealth has not played a significant role in the distributional studies discussed in Part II, there is an extensive literature suggesting that it is a significant measure of inequality. For example, Linda Sugin argues that wealth is a more relevant measure than income for analyzing the fairness of government policies.[233] Moreover, there is a more dramatic, unequal distribution of wealth than of income in the U.S.[234] As of 2012, the top 0.1 percent of Americans owned as much wealth as did the bottom 90%.[235] However, wealth metrics may be more difficult to employ, given that wealth data "is hard to come by and is available only in irregular waves over a number of years."[236]

In summary, while it is likely that distributional analysis of socioeconomic status could use income deciles to determine the distributional impacts of regulatory policies, there is currently no consensus on what additional measures, if any, should be used, or on how they should be aggregated with income to determine the relative socioeconomic status of different groups affected by government policies. Thus, this issue is ripe for engagement by a robust stakeholder group.

More generally, the effects of choosing a unit of analysis, racial aggregation or socioeconomic definition are clear: these methodological choices determine whether regulatory policies should be subjected to additional scrutiny because of their undesirable distributional consequences. A bad choice results not just in a regulatory analysis without the best information, but it also covers up the truth of how families and communities are negatively affected by regulatory action and perpetuates the suffering of these communities.

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[231] *See supra* text accompanying notes 152–154.
[232] *See* Ann Owens, *Income Segregation Between School Districts and Inequality in Students' Achievement*, 91 SOCIOLOGY OF EDUCATION 1, 1 (2018) (discussing the much higher average lifetime incomes of college graduates); Miles Corak, *Income Inequality, Equality of Opportunity, and Intergenerational Mobility*, 27 J. ECON. PERSP. 79, 87–88 (2013) (stating that a U.S. college graduate earned approximately 70% more than a high school graduate as of 2013). *See also* David Autor, *Skills, Education, and the Rise of Earnings Inequality Among the "Other 99 Percent"*, 344 AM. ASS'N ADVANCEMENT SCI. 843, 847 (2014) (concluding that there were large increases in the lifetime earnings of college graduates compared to high school graduates over the previous 30 years).
[233] *See* Linda Sugin, *Tax Expenditures, Reform, and Distributive Justice*, 3 COLUM. TAX L. 1, 27 (2011).
[234] *See* Thomas Piketty, *About "Capital in the Twenty-First Century"*, 105 AM. ECON. REV. 48, 49 (2014) (showing that in the United States the inequality for wealth is much greater than for income).
[235] *See* Berch Berberoglu, *The Nature, Extent and Sources of Wealth and Income Inequality in the United States*, 43 INT'L REV. MOD. SOCIO. 193, 195 (2017).
[236] *Id.* at 194–95.

IV. THE WAY FORWARD

As the Article has explained, despite the best of intentions, the efforts of the Obama and Clinton administrations to make distributional considerations a serious part of the regulatory review process have not borne fruit. Part of the problem, as discussed in Parts II and III, has been the lack of a standardized methodology for performing distributional analysis. In this Part, we set forth further recommendations on how to move forward in a productive way.

Section A discusses how the consideration of alternatives needs to play a central role in distributional analysis. Section B explains that, to get distributional analysis off the ground relatively quickly, to properly account for distributional consequences unrelated to income, and to protect regulations from judicial reversal, the distributional analysis should proceed alongside the standard cost-benefit analysis performed pursuant to Executive Order 12,866, instead of being incorporated into the cost-benefit analysis, through equity weights or otherwise. And Section C argues that, following this approach, regulatory analysis will need to contemplate the possibility that rules that maximize net benefits might nonetheless have suboptimal distributional consequences and have a way for resolving that tradeoff. It then explains why the current approach for taking unquantified benefits into account in cost-benefit analyses provides a blueprint on this issue.

A. *Consideration of Alternatives*

The consideration of alternatives plays a central role in Circular A-4's guidance to agencies on how to conduct regulatory impact analyses. It provides that, first, agencies "should consider a range of potentially effective and reasonably feasible regulatory alternatives."[237] Second, they "should identify the potential benefits and costs for each alternative and its timing."[238]

The reason why the consideration of alternatives is so important is that Executive Order 12,866 requires not only the benefits of a regulation "justify" its costs,[239] but also that agencies "select those approaches that maximize net benefits,"[240] which are benefits minus costs. If an agency looked at only one alternative, call it Alternative A, and found, for example, that the yearly benefits were $100 million and the yearly costs were $90 million, it would be reasonable for the agency to conclude that the benefits of Alternative A "justify" its costs, since the rule has net benefits of $10 million. But without considering other alternatives, the agency would not be in a position to know whether Alternative A maximizes net benefits and therefore whether the adoption of this rule is consistent with the executive order. In this connection, Circular A-4 makes clear that "measuring incremental benefits and costs of successively more stringent regulatory alternatives" will allow an agency to "identify the alternative that maximizes net benefits."[241]

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[237] Office of Info. & Regulatory Affairs, Office of Mgmt. & Budget, *Regulatory Impact Analysis: A Primer* 5 (Aug. 15, 2011), https://www.reginfo.gov/public/jsp/Utilities/circular-a-4_regulatory-impact-analysis-a-primer.pdf [hereinafter Regulatory Impact Analysis]*; see also* Circular A-4, *supra* note 12, at 7.
[238] *Id.*
[239] Exec. Order No. 12,866, *supra* note 3, § 1(b)(6).
[240] *Id.* § 1(a).
[241] Circular A-4, *supra* note 12, at 10.

For example, Alternative B, which is less stringent, might have benefits of only $80 million but costs of $60 million. The net benefits of this rule would therefore be $20 million, which is greater than those of Alternative A. The executive order would therefore counsel the choice of Alternative B over Alternative A. Even though Alternative A is more protective, choosing it over Alternative B would involve the expenditure of an additional $30 million in costs to produce only $20 million in additional benefits. As a result, the choice of Alternative A over Alternative B would be a decision with $10 million in net costs, which would not withstand the scrutiny of cost-benefit analysis.

But that should not be the end of the inquiry either. For example, there might be another, more stringent alternative, Alternative C, that might have $130 million in benefits and $105 million in costs. Its net benefits of $25 million are higher than those of either Alternative A and Alternative B. The executive order would therefore counsel the selection of Alternative C. Without looking at multiple alternatives, the agency might stop its analysis when it finds one possible regulation for which the benefits exceed the costs and overlook the fact that another approach—either a more stringent or less stringent one—might have higher net benefits.

To satisfy the requirements of Circular A-4, an agency does not need to consider an infinite number of alternatives, in search of one that might higher net benefits than the others. But it is customary, in cost benefit analysis, for an agency to at least consider an alternative that is more stringent and one that is less stringent than the alternative selected.[242]

As shown in Part I, while EPA considered alternatives for the purposes of the cost-benefit analysis of significant rules promulgated by the Obama administration, it did not do so for the distributional analysis.[243] But the consideration of alternatives is no less relevant in this context. In fact, Circular A-4 already says as much, in a command honored only in the breach. The accompanying primer makes clear that the analysis of alternatives is not relevant only to cost benefit analyses, unequivocally stating that "[t]he analysis of these alternatives may also consider, where relevant and appropriate, values such as equity, human dignity, fairness, potential distributive impacts, privacy, and personal freedom."[244] And, more specifically, the circular adds that "[w]here distributive effects are thought to be important, the effects of various regulatory alternatives should be described quantitatively to the extent possible, including the magnitude, likelihood, and severity of impacts on particular groups."[245]

The consideration of alternatives is no less important for distributional analysis than it is for cost-benefit analysis. In the example above, reconsider Alternative C, which had the highest net benefits. Compared to Alternative A, it produces $30 million in additional benefits for only $15 million in additional costs. But might the conclusion about the most desirable policy be different if it turned out that the additional costs were all borne by the poorest 1% of the U.S. population and the $30 million in additional benefits were enjoyed by the wealthiest 1%? If Alternative C, the one with the largest net benefits, significantly improves the health outcomes and life

[242] *See* Michael A. Livermore & Richard L. Revesz, *Rethinking Health-Based Environmental Standards*, 89 N.Y.U. L. Rev. 1184, 1239–46 (2014).
[243] *See supra* text accompanying notes 73, 79, 91.
[244] Regulatory Impact Analysis, *supra* note 237, at 3.
[245] Circular A-4, *supra* note 12, at 14.

expectancy of the most privileged individuals but significantly impairs these attributes for the least privileged, might it ever make sense for net benefits to be left on the table, choosing Alternative A instead because of its better distributional attributes? The answer has to be yes, for at least some configurations of benefits and burdens of this sort. Otherwise, distributional analysis would be rendered a nullity, playing no role in regulatory decisions despite the commands of both the Clinton and Obama executive orders, and of the Biden presidential memorandum.[246]

Moreover, unless the distributional consequences of various alternatives is analyzed, an agency might satisfy itself that its chosen policy is acceptable on distributional grounds without knowing that another alternative would be a great deal better. Despite this compelling case for considering alternatives in distributional analysis, the entrenched practice across administrations of both parties has been to not do this work, even for the alternatives that the agencies evaluated in connection with the cost-benefit analysis. Additionally, OIRA never required them to do so, despite the clear command of Circular A-4.

As Part I shows, this work was not done in any of the Obama administration's most significant environmental regulations.[247] The failure is particularly striking because in Executive Order 13,563, the Obama administration underscored its commitment to consider "distributive impacts" and "equity" in regulatory analyses and in Executive Order 13,653 it stressed, more generally, the importance of taking environmental justice concerns into account in government actions.[248]

This discussion highlights that for the laudable goals on distributional matters embodied in President Biden memorandum on Modernizing Regulatory Review to become a reality, the consideration of alternatives will need to play a central role. Here, the fault lies not with Circular A-4, but with the decisions of agencies to consistently ignore its command and with OIRA's decision to consistently look the other way when that happened.

B. *Relationship Between Distributional Analysis and Cost-Benefit Analysis*

There are two generally accepted ways for combining the results of distributional analysis with those of cost-benefit analysis.[249] The first considers the results of the distributional analysis alongside those of the cost-benefit analysis. To the extent that the two analyses point in different directions, the agency would need to evaluate the tradeoff and determine which option best satisfies the competing goals.[250] Section C discusses how tradeoffs of this sort might be evaluated.

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[246] *See supra* text accompanying note 45.
[247] *See supra* text accompanying notes 63–92.
[248] *See supra* text accompanying notes 45–50.
[249] For discussion of a broader set of approaches, see Institute for Policy Integrity, Comments on Avenues to Promote Equity and Advance Environmental Justice Through Rulemaking and Regulatory Analysis July 6, 2021 (Docket No. OMB-2021-0005), https://policyintegrity.org/projects/update/comments-to-omb-on-advancing-equity-and-supporting-underserved-communities.
[250] While this Section largely refers to analyses and procedures for individual regulations, both the Kaldor-Hicks focus on maximizing net benefits and the equity concern to avoid outsized burdens placed on disadvantaged groups

In the second approach, in contrast, distributional consequences are taken into account by incorporating them directly into a social welfare function. The social welfare functions typically used for the purposes of distributional analysis are denominated in units of utility and reflect the commonsense and empirically grounded observation that a fixed amount of additional income has a bigger positive impact on the utility of a poorer individual, compared to that of a wealthier individual.[251] For example, an extra $1000 dollars in the hands of the destitute person would add significantly to that person's utility. In contrast, that money would add very little, if any, utility to Jeff Bezos, the wealthiest person in the world. As a result, a social welfare function in units of utility would find more desirable a policy that gives the money to the destitute person instead of to Bezos.

Unlike a social welfare function of this sort, traditional cost-benefit analysis values $1000 equally, regardless of who gets them. The policy that gives the $1000 to the destitute person could nonetheless be preferred.[252] But that would be a distributional inquiry that is unrelated to the maximization of net benefits.

At least over the short run, revisions to Circular A-4 should embody the former approach, in which a traditional cost-benefit analysis is performed alongside a distributional analysis, without attempting to merge the two into a single social welfare function. There are several compelling reasons for preferring this approach.

First, the assignment of weights in a social welfare function is a controversial endeavor. While there is little doubt that the marginal utility of income, which is the utility of an additional unit of income, decreases as the level of income increases, but there is no accepted methodology in the United States for determining the shape of the function, though there is some experience on this front in other countries, particularly the United Kingdom.[253] As a result, any choice of a social welfare function could prove controversial and be the focus of challenges in court to any rules that were justified by reference to such functions.

Second, whereas there is an academic literature on how to take income differences into account in constructing social welfare functions, there is considerably less experience with respect to other socioeconomic characteristics that might be relevant to distributional concerns, like education and health.[254] As a result, the necessary scientific support for justifying such functions might currently be lacking.

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are best served by an approach that measures distribution not just of *one* individual regulation's effects, but of the effects across regulations. *See* Revesz, *supra* note 9, at 1571. This is one reason why standardization is important: so that agency and OIRA staff can compare distributional analyses across rules.

[251] *See* MATTHEW D. ADLER, MEASURING SOCIAL WELFARE: AN INTRODUCTION 16 (2019); Matthew D. Adler, *Factoring Equity into Benefit-Cost Analysis*, REG. REV. (Apr. 26, 2021), https://www.theregreview.org/2021/04/26/adler-factoring-equity-benefit-cost-analysis/.

[252] Daniel Hemel perceptively points out that the distribution of costs is just as important as the distribution of benefits and should be included in distributional analysis. *See Regulation and Redistribution with Lives in the Balance* 16–17 (U. Chi., P. Law Working Paper No. 767).

[253] Her Majesty's Treasury, The Green Book: Central Government Guidance on Appraisal and Evaluation 97 (2020).

[254] For an example of such work, see Maddalena Ferranna et al., *Addressing the COVID-19 Pandemic: Comparing Alternative Value Frameworks* 19 (National Bureau of Economic Research, March 29, 2021), https://doi.org/10.3386/w28601.

Third, and more fundamentally, many government policies have negative impacts on people of color, even when controlling for income. Indeed, that disparity is a central concern of the environmental justice movement.[255] There is simply no accepted methodology for how to add weights in a social welfare function based on racial classifications. And, moreover, doing so would raise thorny constitutional problems. For example, in *Gratz v. Bollinger*,[256] the Supreme Court struck down preferences granted to racial groups based on a mathematical formula.[257] A full analysis of this constitutional issue is beyond the scope of this Article, but the risk of proceeding down this path is sufficiently high that it should give the Biden administration pause.[258]

Fourth, a number of judicial decisions have called regulations into question if their benefits did outweigh their costs. Most prominently, in *Michigan v. EPA*,[259] the Supreme Court determined that "[n]o regulation is 'appropriate' if it does significantly more harm than good."[260] In this respect, the courts are familiar with regulatory impact analyses that are performed pursuant to Executive Order 12,866, which involves comparisons of costs and benefits, not of more complex social welfare functions. To socialize distributional analysis into a judicial system that is often skeptical of regulation,[261] it would be preferable to do so in a manner that does not involve a wholesale change to the approach to regulatory analysis with which the courts have become familiar. On this score, considering distributional concerns alongside a traditional cost-benefit analysis is precisely the approach already embodied in President Clinton's Executive Order 12,866, President Obama's Executive Order 12,563, and the George W. Bush administration's Circular A-4. Simply implementing a procedure already approved by presidents of both parties and in effect for a quarter century is a far less heavy lift than a wholesale overhaul of the whole regulatory review process.

Fifth, the Biden administration faces the significant challenge of revamping the procedures for conducting regulatory analysis, pursuant to the presidential memorandum on Modernizing Regulatory Review at the same time that it undoes a significant number of Trump administration policies and launches its own ambitions agenda in a variety of areas.[262] Presidential administrations have a large incentive to move as quickly as possible to put in place their regulatory agendas because the longer they wait, the more likely it is that their regulatory

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[255] *See supra* text accompanying notes 32–33.
[256] 539 U.S. 244 (2003).
[257] *See id.* at 279 (O'Connor, J., concurring) (concluding that a public university admissions process that allocates points based on race violates the Equal Protection Clause).
[258] For decisions striking down Biden administration policies on similar grounds, see Vitolo v. Guzman, No. 21-5517, __ F.3d __, 2021 WL 2172181 (6th Cir. May 27, 2021); Faust v. Vilsack, No. 21-C-548, __ F. Supp. 3d __, 2021 WL 2409729 (E.D. Wis. June 10, 2021) (blocking a loan forgiveness program based on the race of the applicant).
[259] 576 U.S. 743 (2015).
[260] *Id.* at 752.
[261] *See* Jacob M. Schlesinger, *Biden's Hurdle: Courts Dubious of Rule by Regulation,* WALL ST. J. (Mar. 2, 2021), https://www.wsj.com/articles/bidens-hurdle-courts-dubious-of-rule-by-regulation-11614701629.
[262] For the Biden administration's ambition in the climate change and environmental fronts, see Exec. Order No. 14,008, 86 Fed. Reg, 7619 (2021) ("Tackling the Climate Crisis at Home and Abroad"); Exec. Order No. 13,990, 86 Fed. Reg. 7037 (2021) ("Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis").

output will be undone by a subsequent administration of the opposite party.[263] As a result, it is preferable to incorporate distributional analysis in a way that does not involve a complete overhauling of the whole process of regulatory impact analysis, which would be an enormously complex and time consuming venture.

C. *Preferable Distributional Consequences as an Unquantified Benefit*

If, as this Article strongly urges, the Biden administration chooses to have distributional analysis proceed alongside traditional cost-benefit analysis, instead of being incorporated into a social welfare function, how should tradeoffs between net benefits and distributional outcomes be evaluated? Specifically, consider an alternative that has higher net benefits but less desirable distributional outcomes because fewer of these benefits accrue to disadvantaged populations. It must be the case that in some cases, net benefits should be left on the table to promote distributional goals. Otherwise, distribution considerations would play absolutely no role in regulatory decisionmaking, and the Biden administration would not accomplish a core objective embodied in its presidential memorandum on Modernizing Regulatory Review.

But what amount of net benefits should compromised in order to achieve the more attractive distributional outcome? The amount has to be bounded or else cost-benefit analysis would become the nullity. So, the right amount should not be zero and should not be infinite, but something in between. But how much?

While this question might appear intractable at first glance, it in fact is not. Quite to the contrary, it has a well-accepted regulatory analogy in the treatment of unquantified benefits. While cost-benefit analysis prefers the quantification of costs and benefits, it contemplates the possibility that it sometimes might not be possible to do so because of the lack of accepted techniques.[264] Unquantified benefits, however, have a place in cost-benefit analyses and decisionmakers are required to take them into account. Executive Order 12,866 requires agencies to assess "qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider."[265] And Circular A-4 underscores the relevance of unquantified benefits in regulatory analysis: "For cases in which the unquantified benefits or costs affect a policy choice, [agencies] should provide a clear explanation of the rationale behind the choice."[266] Not only have the courts upheld the reliance on unquantified benefits but they have struck down agency decisions, particularly during the Trump administration, for ignoring unquantified benefits.[267]

By analogy, the better distributional consequences of a particular alternative should be regarded as an unquantified benefit. If that alternative has lower quantified net benefits than another alternative, the agency will need to determine whether the better distributional consequences is sufficiently compelling to overcome the loss in quantified net benefits. That is exactly the same inquiry that happens now with respect to other unquantified benefits. And

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[263] *See* Bethany A. Davis Noll & Richard L. Revesz, *Regulation in Transition*, 104 MINN. L. REV. 1, 65–73 (2019).
[264] *See* Richard L. Revesz, *Quantifying Regulatory Benefits*, 102 CAL. L. REV. 1423, 1425 (2014). Over time, however, as science evolves, previously unquantifiable consequences can be quantified. *See id.* at 1436–50.
[265] Exec. Order No. 12,866, *supra* note 3, § 1(a).
[266] Circular A-4, *supra* note 12, at 27.
[267] *See* Richard L. Revesz, *Destabilizing Environmental Regulation: The Trump Administration Concerted Attack on Regulatory Analysis*, 47 ECOLOGY L.Q. 887, 899–901 (2020).

OIRA even has useful guidance on how this work might be done: "When quantification of a particular benefit or cost is not possible, it should be described qualitatively."[268] And its command that agencies consider values such as "equity, human dignity, fairness, potential distributive impacts" directly follows this sentence,[269] indicating that these values fall within the set of unquantified benefits that agencies must weigh against quantified net benefits.

In summary, three decisions are key to fulfilling the promise of President Biden's commitment to seriously taking distributional concerns into account in the regulatory process. First, the consideration of alternatives needs to be a key part of the distributional analysis. In some sense this step should be easy because such a command is already part of the relevant documents governing regulatory analysis, even though it has never been implemented. Second, distributional analysis should proceed alongside cost-benefit analysis rather than incorporated into cost-benefit analysis through distributional weights. Third, better distributional consequences should be treated as an unquantified benefit when weighed against the quantified net benefits of the distributional analysis.

CONCLUSION

For distributional analysis to become a meaningful part of the regulatory state, the Biden administration will need to engage in two key undertakings. First, it will need to oversee a process that will produce detailed guidance to agencies on how they should conduct distributional analysis following a standardized protocol. Absent such standardization, it will not be possible to determine in a credible way whether the distributional consequences of a rule are attractive or concerning.

Second, the Biden administration will need to effectively enforce the already existing requirement that agencies consider the distributional consequences of different alternatives, just like agencies do so with respect to cost-benefit analyses. And OIRA will need to police the compliance with this requirement. Agencies are already required to undertake this analysis, but they have ignored it for a quarter century and OIRA has looked the other way when it has reviewed their regulations. "This time we mean it" approaches tend not to be particularly effective with children and are unlikely to work better in this context unless President Biden can convey strong presidential interest in making distributional analysis a meaningful part of the regulatory state, which Presidents Clinton and Obama were not able to do.

[268] Regulatory Impact Analysis, *supra* note 237, at 3.
[269] *Id.*