DISTRIBUTIONAL CONSEQUENCES AND REGULATORY ANALYSIS

BY

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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 regulations has never gotten off the ground. Unlike cost-benefit analysis, it has not become a meaningful part of the analysis of regulatory consequences.

On 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 how 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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I. INTRODUCTION

Cost-benefit analysis has been a significant component of the regulatory state since the 1980s.[1] First, President Reagan in Executive Order 12291[2] and then President Clinton in Executive Order 12866,[3] prescribed that administrative agencies in the Executive Branch should undertake distributional analysis as part of their justification for

[1] *See* RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 24–42 (2008) (discussing the development of cost-benefit analysis in the administrative state from beginning of the Reagan presidency through the early 2000s, and highlighting major controversies associated therewith).

[2] Federal Regulation, Exec. Order No. 12,291, 3 C.F.R. 127, 128 (1982).

[3] Regulatory Planning and Review, Exec. Order No. 12,866, 3 C.F.R. 638, 638–39 (1994).

promulgating significant regulations. The Office of Information and Regulatory Affairs (OIRA) was directed 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 all the emissions reductions benefit a high-income, white neighborhood and all the costs are borne by a low-income, minority neighborhood.

To address troubling distributional consequences of this sort, both the Clinton order and Executive Order 13563, 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 on 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

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[4] *See* Nicholas Bagley & Richard L. Revesz, *Centralized Oversight of the Regulatory States*, 106 COLUM. L REV. 1260, 1263–64, 1267–68 (2006) (discussing the use of OIRA review of agency decision-making across the Reagan, Clinton, and later administrations).

[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 257–259 (discussing Executive Order 12866's requirement that agencies maximize net benefits when considering action alternatives).

[6] 3 C.F.R. at 638–39; Improving Regulation and Regulatory Review, Exec. Order No. 13,563, 76 Fed. Reg. 3821, 3821 (Jan. 21, 2011).

[7] *See infra* text accompanying notes 33–38 (discussing President Clinton's Executive Order 12898 and later environmental justice policy and guidance from the Obama administration); Preparing the United States for the Impacts of Climate Change, Exec. Order No. 13,653, 3 C.F.R. 330, 330–32, 335 (2013).

[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 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) (discussing how to make distributional analysis a meaningful component of the evaluation of regulations).

Review, which directs the Office of Management and Budget (OMB), 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. This 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; 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.

This 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 to conduct it. 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

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[10] Memorandum on Modernizing Regulatory Review, 86 Fed. Reg. 7223, 7223 (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) (discussing the applicability of the cost-benefit framework in different regulatory contexts).

[12] OFF. OF MGMT. & BUDGET, CIRCULAR A-4, at 1 (2003) [hereinafter CIRCULAR A-4].

[13] *See infra* text accompanying notes 75, 100–102.

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?

This Article is organized as follows. Part II 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, Part II 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 III 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 IV 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 they have lacked until now.

Lastly, Part V 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 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 V 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, Part V explains how the better distributional consequences of one alternative can be traded off against the higher net benefits of a different alternative.

II. THE LEGAL LANDSCAPE ON DISTRIBUTION

In 1981, President Reagan signed Executive Order 12291,[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 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 12291 received from regulatory advocates,[19] President Clinton retained the framework from the Reagan order in his own Executive Order 12866, 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 12866 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

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14 Federal Regulation, Exec. Order No. 12,291, 3 C.F.R. 127, 134 (1982).

15 *See id.* at 129 (giving Director of OMB, of which OIRA is a part, authority "to review any preliminary or final Regulatory Impact Analysis, notice of proposed rulemaking, or final rule based on the requirements of" Executive Order 12291).

16 *Id.* at 128.

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. L. REV. 103, 104–05 (2011) (stating that "[c]ertainly Democratic members of Congress had been very critical of OIRA during the Reagan-Bush years, and the Democratic base—the environmentalist, organized labor, and public health and safety groups—wanted OIRA dismantled or at least neutered").

20 *Id.* at 105; Regulatory Planning and Review, Exec. Order No. 12,866, 3 C.F.R. 638, 638–40 (1994).

21 *Compare* Regulatory Planning and Review, Exec. Order No. 12,866, 3 C.F.R. 638, 639 (1994), *with* Federal Regulation, Exec. Order No. 12,291, 3 C.F.R. 127, 128 (1982).

22 3 C.F.R. at 639.

23 *See* REVESZ & LIVERMORE, *supra* note 1, at 31–32 (stating that the Clinton administration "emphasized that agencies should weigh 'qualitative measures,'" and that "cost-benefit analysis could serve as a neutral tool").

parties.[24] President Obama reaffirmed the Clinton order in Executive Order 13563,[25] as did President Trump in Executive Order 13771.[26]

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] Part II.A describes past efforts to introduce distributional analysis into the review process. Part II.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 Part 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 12866 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.

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[24] Revesz, *supra* note 9.

[25] Improving Regulation and Regulatory Review, Exec. Order No. 13,563, 3 C.F.R. 215, 215 (2012).

[26] Reducing Regulation and Controlling Regulatory Costs, Exec. Order No. 13,771, 82 Fed. Reg. 9339, 9340 (Feb. 3, 2017).

[27] 3 C.F.R. at 639; 3 C.F.R. at 215.

[28] Revesz, *supra* note 9.

[29] *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." Memorandum on Modernizing Regulatory Review, 86 Fed. Reg. 7223, 7223 (Jan. 26, 2021). However, it is too early to evaluate the impact of these actions.

[31] 3 C.F.R. at 639.

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 12898, 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 12898 does not instruct agencies on *how* to perform environmental justice analysis, but federal agencies have issued guidance documents, the first of which was published in 1997 by the Council on Environmental Quality.[34] EPA's 2014 "Plan EJ," named in recognition of Clinton's 12898 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 12866 is the blueprint for centralized review, then Circular A-4 serves as the instruction manual. Circular A-4 is a forty-eight-page technical document that instructs agencies on how to perform

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[32] H. Spencer Banzhaf et al., *Environmental Justice: Establishing Causal Relationships*, 11 ANN. REV. RES. ECON. 377, 379 (2019).

[33] Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, Exec. Order No. 12,898, 3 C.F.R. 859, 859 (1995).

[34] COUNCIL ON ENV'T QUALITY, ENVIRONMENTAL JUSTICE: GUIDANCE UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT 1 (1997).

[35] U.S. ENV'T PROT. AGENCY, PLAN EJ 2014, at 9 (2011); *Plan EJ 2014 Background*, U.S. ENV'T PROT. AGENCY, https://perma.cc/3EQP-56A5 (last updated Nov. 30, 2020).

[36] U.S. ENV'T PROT. AGENCY, TECHNICAL GUIDANCE FOR ASSESSING ENVIRONMENTAL JUSTICE IN REGULATORY ANALYSIS 1 (2016) [hereinafter TECHNICAL GUIDANCE].

[37] The analytic methods presented include: "summary statistics," demonstrating effects for different types of individuals across groups; "visual displays, such as maps, charts, and graphs;" "proximity-based analysis," which compare 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 serve 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 58 ("[E]ven 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.").

the various analyses for centralized review.[39] Developed by OMB under the Bush administration in 2003, this document has served for nearly two decades as the primary guidance for the preparation of regulatory analyses to comply with the mandate of the Clinton order.[40]

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."[41] In regards to cost-benefit analysis, Circular A-4 instructs agencies on how to develop a baseline, how to estimate costs and benefits, how to determine the appropriate discount rate, and how to account for uncertainty.[42] These materials occupy approximately thirty pages of the document.[43]

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)."[44] The discussion provides virtually no guidance, merely indicating that regulatory analyses "provide a separate description of distributional effects . . . described quantitatively to the extent possible."[45]

3. Distributional Analysis Under President Obama

President Obama reaffirmed the Clinton Order's commitment to considering distributional impacts. In fact, Executive Order 13563 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*)."[46] 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."[47] But, once again, no guidance is provided on how the distributional analysis should be conducted.

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[39] *See* CIRCULAR A-4, *supra* note 12, at 1–2 (providing an overview of the purposes of the Circular, i.e., defining good regulatory analysis and standardizing cost-benefit analysis).

[40] *Id.* at 1; *see* Jerry Ellig, *Why and How Independent Agencies Should Conduct Regulatory Impact Analysis*, 28 CORNELL J. L. & PUB. POL'Y 1, 27 (2018) (stating that "distributional analysis is rare even in regulatory impact analyses from executive branch agencies," leaving Circular A-4 as the primary guidance for nearly two decades).

[41] CIRCULAR A-4, *supra* note 12.

[42] *Id.* at 15–46.

[43] *Id.*

[44] *Id.* at 14.

[45] *Id.*

[46] *Compare* Regulatory Planning and Review, Exec. Order No. 12,866, 3 C.F.R. 638, 639 (1994), *with* Improving Regulation and Regulatory Review, Exec. Order No. 13,563, 76 Fed. Reg. 3821, 3821 (Jan. 21, 2011) (emphasis added).

[47] 76 Fed. Reg. at 3821.

President Obama similarly reaffirmed the Clinton commitment to promoting environmental justice. Executive Order 13653, "Preparing the United States for the Impacts of Climate Change,"[48] acknowledges that climate change "impacts are often most significant for communities that already face economic or health-related challenges."[49] But while it indicates that "[m]anaging these risks requires deliberate preparation, close cooperation, and coordinated planning," [50] 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,[51] as is reflected in the regulatory initiatives discussed in Part II.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.

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 twenty-four of President Obama's major regulations with quantified health benefits from Fiscal Years 2010 through 2013.[52] 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

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[48] Preparing the United States for the Impacts of Climate Change, Exec. Order No. 13,653, 3 C.F.R. 330 (2014).

[49] *Id.*; *see also* Proclamation No. 9082, 79 Fed. Reg. 8821, 8821 (Feb. 13, 2014) (identifying "low-income neighborhoods" and neighborhoods with health disparities as areas that "disproportionately b[a]re environmental burdens").

[50] 3 C.F.R. at 330.

[51] *See* EXEC. OFF. OF THE PRESIDENT, THE PRESIDENT'S CLIMATE ACTION PLAN 5 (2013) (explaining that the Obama administration established "tough new rules to cut carbon pollution . . . [to] protect the health of our children and move our economy toward American-made clean energy sources that will create good jobs and lower home energy bills" without any mention of how the impacts of these new rules will be distributed).

[52] Lisa A. Robinson et al., *Attention to Distribution in U.S. Regulatory Analyses*, 10 REV. ENV'T ECON. & POL'Y 308, 325 (2016).

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."[53] The authors suggested that agencies assume that distributional impacts are not significant enough to "warrant detailed analysis"[54] 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.[55] 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.[56]

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."[57] Most importantly, the authors noted that "[i]n no case did the Administration's explicit concern for equity clearly alter proposed policies."[58]

The situation had not improved fifteen 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.[59] Yet, he found that even "[t]his seemingly simple type of distributional analysis is rare."[60]

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."[61] He noted that EPA regulatory staff does not appear to take its own environmental justice guidance seriously: only seven of nearly 4,000 Obama-era EPA rules took environmental justice concerns into account in their analyses.[62]

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.[63]

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[53] *Id.* at 323.

[54] *Id.* at 321.

[55] *Id.* at 320, 323.

[56] *Id.* at 322.

[57] Robert W. Hahn et al., *Environmental Regulation in the 1990s: A Retrospective Analysis*, 27 HARV. ENV'T L. REV. 377, 405 (2003).

[58] *Id.*

[59] Ellig, *supra* note 40.

[60] *Id.*

[61] Revesz, *supra* note 9, at 1542.

[62] *Id.* at 1540.

[63] Richard L. Revesz, *A New Era for Regulatory Review*, REGUL. REV. (Feb. 16, 2021), https://perma.cc/7XSX-W7J3.

2. Major Environmental Regulations

The regulatory impact assessments of President Obama's major environmental initiatives expose at best a perfunctory approach to distributional analysis. The following three regulations 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 affects stationary sources of pollution. Regulation of stationary sources of pollution particularly implicates 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 1) disparities would remain even with the regulation, 2) a more stringent standard could reduce those disparities, or 3) 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."[64]

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.[65] The rule, promulgated under the Clean Air Act's Good Neighbor Provision,[66] was designed to reduce air pollution in twenty-seven states upwind of states that would otherwise be unable to meet the National Ambient Air Quality Standards.[67] In 2013, for example, 93% of the air pollution in parts of Connecticut originated in upwind states.[68] As a result, absent emissions reductions in those states, Connecticut may not have been able to come into compliance with the ambient standards.[69]

The rule's regulatory analysis is 414 pages long.[70] It is composed of ten chapters focusing on the following substantive topics: emissions

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64 CIRCULAR A-4, *supra* note 12, at 2.

65 *Overview of the Cross-State Air Pollution Rule (CSAPR)*, U.S. ENV'T PROT. AGENCY, https://perma.cc/R4CY-BVMR (last updated Apr. 9, 2021); North Carolina v. U.S. Env't Prot. Agency, 550 F.3d 1176, 1178 (D.C. Cir. 2008).

66 U.S. ENV'T PROT. AGENCY, THE CROSS-STATE AIR POLLUTION RULE: REDUCING THE INTERSTATE TRANSPORT OF FINE PARTICULATE MATTER AND OZONE 3–4.

67 *Overview of the Cross-State Air Pollution Rule (CSAPR)*, *supra* note 65; *States that are Affected by the Cross-State Air Pollution Rule (CSAPR)*, U.S. ENV'T PROT. AGENCY, https://perma.cc/5362-KU36.

68 Editorial, *A Fight over Cross-State Pollution*, N.Y. TIMES (Dec. 13, 2013), https://perma.cc/92NE-2M5G.

69 CONN. DEP'T ENERGY ENV'T PROT., DRAFT FOR PUBLIC COMMENT: ENCLOSURE A: REVISION TO CONNECTICUT'S STATE IMPLEMENTATION PLAN, 8-HOUR OZONE ATTAINMENT DEMONSTRATION FOR THE CONNECTICUT PORTION OF THE NEW YORK – NORTHERN NEW JERSEY-LONG ISLAND (NY-NJ-CT) NONATTAINMENT AREA TECHNICAL SUPPORT DOCUMENT, at E-1 (2017).

70 U.S. ENV'T PROT. AGENCY, EPA-HQ-OAR-2009-0491, REGULATORY IMPACT ANALYSIS FOR THE FEDERAL IMPLEMENTATION PLANS TO REDUCE INTERSTATE TRANSPORT OF FINE PARTICULATE MATTER AND OZONE IN 27 STATES; CORRECTION OF SIP APPROVALS FOR 22 STATES (2011).

impacts, air quality impacts, benefits analysis, cost and economic impacts, macroeconomic and employment impacts.[71] 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.[72] Specifically, it referenced a distributional analysis that "estimated the $PM_{2.5}$ mortality risks according to race, income, and educational attainment before and after implementation of the Transport Rule."[73] EPA took solace in the fact that "all populations [will] see their mortality risk fall" as a result of the rule.[74] However, the report provides no quantified characterization of the 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.[75] 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.[76] The rule's regulatory analysis is 510 pages long.[77] Twenty-one pages are devoted to issues related to distribution and environmental justice.[78] The document describes a distributional analysis that identified the nation's counties where $PM_{2.5}$ mortality risk distribution would be at or above the median and upper 95th percentile 1) before and 2) after implementation of the rule.[79] 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 $PM_{2.5}$ Before and After Implementation of MATS by 2016 for Each Populations, Stratified by Race."[80]

EPA concluded that all populations, including subpopulations protected by Executive Order 12898, could benefit from a reduction in $PM_{2.5}$ mortality risk.[81] However, it also noted that "limits to data resolution prevent us from delineating the $PM_{2.5}$ mortality risk according

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[71] *Id.* at ii–v.

[72] *Id.* at 322–24.

[73] *Id.* at 323.

[74] *Id.* at 334.

[75] *Id.* at 323.

[76] *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://perma.cc/W5ZH-7XBZ; National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Steam Generating Units, 77 Fed. Reg 9304, 9308 (Feb. 16, 2012).

[77] U.S. ENV'T PROT. AGENCY, EPA-452/R-11-011, REGULATORY IMPACT ANALYSIS FOR THE FINAL MERCURY AND AIR TOXICS STANDARDS (2011).

[78] *Id.* at 7-35 to 7-56.

[79] *Id.* at 7-51 to 7-52.

[80] *Id.* at 7-44 to 7-49, 7-52 to 7-53.

[81] *Id.* at 7-54.

to population race with confidence."[82] 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.[83]

As in the case of the Cross-State Air Pollution Rule, EPA's distributional analysis is essentially based on the syllogism that 1) disadvantaged communities are disproportionately affected by air pollution, 2) the rule in question will reduce such pollution, and 3) so therefore, the rule must be advantageous to the disadvantaged communities.[84] 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).[85] While the document analyzes the average mercury deposition levels for three different emissions control scenarios,[86] the discussion of distribution is confined only to the potential "implementation of *this final rule*."[87] Thus, as with the Good Neighbor Provision, 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 decision-making 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."[88]

Finally, the Clean Power Plan was an EPA regulation designed to limit the greenhouse gas emissions of existing power plants,[89] which in

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[82] *Id.*

[83] *Id.* at 7-36 (emphasis added).

[84] *See* Revised Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS, 86 Fed. Reg. 23,054, 23,162–63 (Apr. 30, 2021) (to be codified at 40 C.F.R. pts. 51, 52, 78, 97) (explaining the environmental justice concerns the EPA considers when evaluating a proposed rule).

[85] U.S. ENV'T PROT. AGENCY, *supra* note 77, at ES-2.

[86] *Id.* at 54–56.

[87] *Id.* at 7-35 (emphasis added).

[88] *Id.*

[89] *See* U.S. ENV'T PROT. AGENCY, FACT SHEET: OVERVIEW OF THE CLEAN POWER PLAN 1 (2017) (explaining the Clean Power Plan's standards to reduce carbon pollution from power plants). The rule was subsequently rescinded by the Trump administration. Repeal of the

2012 accounted for 38% of U.S. carbon dioxide emissions and 31% of U.S. emissions of other greenhouse gases.[90] 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 1,500–3,600 fewer premature deaths, 1,700 fewer premature heart attacks, and 90,000 fewer asthma attacks in children.[91]

EPA's regulatory analysis for the Clean Power Plan is 344 pages long.[92] Less than one page is devoted to discussing the health concerns for low-income households with children.[93] The report merely summarizes prior research findings concerning the vulnerabilities of these households.[94] 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."[95]

The report devotes less than four pages to the discussion of environmental justice.[96] It claims that because minority communities are disproportionately affected by climate change, such communities will be disproportionately benefitted by the Clean Power Plan.[97] It bases this contention simply on the assertion that the rule will result in a reduction of greenhouse gases.[98] 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."[99] But it provides no accounting of or description of these actions.[100] 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.[101] 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

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Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations, 84 Fed. Reg. 32,520, 32,520 (Jul. 8, 2019) (to be codified at 40 CFR pt. 60).

90 U.S. ENV'T PROT. AGENCY, EPA-425/R-15-003, REGULATORY IMPACT ANALYSIS FOR THE CLEAN POWER PLAN FINAL RULE 2-24 (2015).

91 *Id.* at 4-31*;* U.S. ENV'T PROT. AGENCY, *supra* note 89, at 2.

92 U.S. ENV'T PROT. AGENCY, *supra* note 90.

93 *Id.* at 7-16 to 7-17.

94 *See id.* at 7-17 (describing how literature cited in EPA's 2009 endangerment finding noted that additional climate-caused health concerns arise for children in low-income homes, such as food insecurity resulting from reduced food availability or increased prices).

95 *Id.*

96 *Id.* at 7-18 to 7-21.

97 *Id.* at 7-20.

98 *Id.*

99 *Id.* at 7-21.

100 *See id.* (offering only a conclusory statement that "EPA has taken a number of actions" but providing no examples of those actions).

101 *Id.* at 7-20.

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."[102]

The review of the academic literature coupled with our review of the major EPA regulations promulgated during the Obama administration establishes 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 because pollution disproportionately affects disadvantaged communities and 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 a sensible implementation of 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 discussed above.[103] 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.

III. 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 analysis. As part of this effort, we examine the methodologies employed by a large universe of studies that measure "disproportionate impact."[104] 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 of civic engagement, and determination of

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[102] *Id.*

[103] ENV'T PROT. AGENCY, *supra* note 70, at 323–24; ENV'T PROT. AGENCY, *supra* note 77, at 7-36 to 7-38; ENV'T PROT. AGENCY, *supra* note 90, at 7-18 to 7-22.

[104] *See* H. Spencer Banzhaf et al., *Disproportionate Impact Methodologies* (listing a complete record of disparate impact studies) (on file with the authors).

disproportionate impact.[105] For each of these elements, there is no consensus on how the analysis should be done, with different studies using significantly different approaches.

Part III.A explains how the studies were selected in this Article's analysis. In the subsequent Parts, the various approaches the studies use for each of the five methodological elements listed above are discussed. Most of the articles included in this analysis do not explain why they make a particular choice with respect to an element. But where they do, an explanation is provided.

A. A Meta-Analysis

This analysis is limited to studies that empirically analyze a research question about the disproportionate impacts of environmental pollution. To avoid creating an authorial bias by personally selecting the articles the authors deem the most important from the literature, this Article develops 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.[106]

The Banzhaf et al. article argues that disparate impacts produced by pollution should be studied using econometric techniques to design an effective policy to eliminate such inequities.[107] To that end, the article engages in a comprehensive review of the environmental justice literature over the past thirty years, 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.[108]

The authors 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.[109] Out of this full universe, the authors selected the thirty-seven works that use quantitative research methods to analyze either pre-existing data or data the authors gathered themselves.

The selected studies 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

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105 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, 522, 546 (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.

106 Banzhaf et al., *supra* note 32.

107 *Id.* at 378, 379.

108 *Id.* at 379–81.

109 *See id.* 392–98 (citing literature).

of studies allows the authors to observe methods used by academics facing a variety of challenges, including access to appropriate data;[110] measurement issues, such as how to determine the appropriate geographic unit to measure the impact of a local source of air pollution;[111] and challenges in seeking to determine causation.[112]

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

B. Unit of Analysis

All thirty-seven studies investigate whether environmental outcomes are disproportionately distributed across the population. 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 than units where this proportion is lower.

Many studies define the unit of analysis by reference to data from the U.S. Census framework, with nineteen studies (51%) using either census block groups or census tracts as their unit of analysis.[113] This approach is convenient because many national datasets break down information into these units.[114]

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110 *See* Ed Gerrish & Sharon Lea Watkins, *The Relationship Between Urban Forests and Income: A Meta-Analysis*, 170 LANDSCAPE & URB. PLAN. 293, 297 (2018) (implementing a dissimilarity index to estimate the distribution of racial groups across census tracts).

111 *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., *Playing It Safe: Assessing Cumulative Impact and Social Vulnerability through an Environmental Justice Screening Method in the South Coast Air Basin, California*, 8 INT'L J. ENV'T RSCH. & PUB. HEALTH 1441, 1443–44 (2011) (proposing "an Environmental Justice Screening Method" that incorporates twenty-three indicator metrics to improve upon the simple use of income and race to measure relative impacts on vulnerable communities).

112 *See, e.g.*, Seema Arora & Timothy N. Cason, *Do Community Characteristics Influence Environmental Outcomes? Evidence from the Toxics Release Inventory*, 1 J. APPLIED ECON. 413, 418 (1998) ("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.").

113 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, https://perma.cc/3KPR-G2P7 (last revised Oct. 8, 2021).

114 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).

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."[115] The tract boundaries are updated before each decennial census.[116] These tracts can differ in population size from 1,200 to 8,000 people.[117] The U.S. Census Bureau explains the tracts are designed "to provide a stable set of geographic units for the presentation of statistical data."[118]

Baden and Coursey defend the use of census tracts as a unit of analysis, citing other research showing the tracts have "local descriptive power" that other units do not because they are drawn by local committees "to reflect local ideas of homogenous neighborhoods."[119] 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.[120]

Seven studies (19%) use census block groups.[121] A census block group is a "statistical division[] of census tracts . . . generally defined to contain between 600 and 3,000 people."[122] Every census tract contains at least one block group.[123] These block groups typically cover a contiguous area of land, but they do not "cross state, county, or census tract boundaries."[124] 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 for choosing 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."[125] Liévanos suggests that the use of this same unit by prior studies makes such a choice preferable because it

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115 *Glossary*, *supra* note 113.

116 *Id.*

117 *Id.*

118 *Id.*

119 Baden & Coursey, *supra* note 114.

120 *Id.*

121 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." *Glossary*, *supra* note 113. None of the studies in this Article's universe used census blocks as their unit of analysis.

122 *Id.*

123 *Id.*

124 *Id.*

125 Anna Rosofsky et. al, *Temporal Trends in Air Pollution Exposure Inequality in Massachusetts*, ENV'T RSCH., Feb. 2018, at 77; *see also* Marc D. Shapiro, *Equity and Information: Information Regulation, Environmental Justice, and Risks from Toxic Chemicals*, 24 J. POL'Y ANALYSIS & MGMT. 373, 376–77, 386 (2005) (using a difference-of-means test to observe changes in emissions and risk over time, noting block groups were used due to the data available).

facilitates comparisons.[126] 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 do[es] not hold at smaller resolution due to spatial heterogeneity."[127]

Six studies (16%) use counties for their unit of analysis. Konisky justifies this choice by referring "to constraints posed by the available EPA enforcement data."[128] Hird argues that a "county is both large enough to include the effects of hazardous waste sites, and small enough to record significant socioeconomic variation."[129]

Four studies (11%) use zip codes as their unit of analysis. Brooks and Sethi point out that the U.S. Census collects demographic data, including race and poverty status at the zip code level.[130] 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.[131] 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.[132]

Three studies (8%) conduct their research using data at the individual household level. Binner and Day argue that their study requires an investigation at this disaggregated level in order to observe whether households choose to rent or purchase their home.[133] 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.[134]

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126 *See* Raoul S. Liévanos, *Sociospatial Dimensions of Water Injustice: The Distribution of Surface Water Toxic Releases in California's Bay-Delta*, 60 SOCIO. PERSPS. 575, 580 (2017) (comparing block-group demographics' air-toxic levels in California's Bay-Delta).

127 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).

128 David M. Konisky, *Inequities in Enforcement? Environmental Justice and Government Performance*, 28 J. POL'Y ANALYSIS & MGMT. 102, 106 (2009).

129 John A. Hird, *Environmental Policy and Equity: The Case of Superfund*, 12 J. POL'Y ANALYSIS & MGMT. 323, 331 n.13 (1993).

130 Nancy Brooks & Rajiv Sethi, *The Distribution of Pollution: Community Characteristics and Exposure to Air Toxics*, 32 J. ENV'T ECON. & MGMT. 233, 240 (1997).

131 *Id.* at 239.

132 *Id.* at 237.

133 Amy Binner & Brett Day, *How Property Markets Determine Welfare Outcomes: An Equilibrium Sorting Model Analysis of Local Environmental Interventions*, 69 ENV'T & RES. ECON. RES. 733, 735 (2018).

134 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).

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 400 U.S. pulp and paper mills.[135] 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.[136]

Table 1 summarizes the results for unit of analysis.

Table 1. Unit of Analysis		
Categories	**Count**	**Percentage**
Census Tract	12	32%
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 thirty-seven 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 fifteen of the studies (48%), breaks down the racial composition of observed populations. 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.[137]

In contrast, four studies (13%) aggregate non-whites in various ways. For example, although Arora and Cason report the full racial breakdown

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[135] Wayne B. Gray & Ronald J. Shadbegian, "*Optimal" Pollution Abatement: Whose Benefits Matter, and How Much?*, 47 J. ENV'T ECON. MGMT. 510, 518 (2004).

[136] *See* Chakraborty & Armstrong, *supra* note 111, at 149–51 (explaining the use of the Geographic Plume Analysis to evaluate environmental quality with a chemical dispersion model and a Geographic Information System demographic database).

[137] 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 PERSPS. 1, 2 (2017).

of the population observed, the authors aggregate all non-white[138] residents both in their analysis and in the discussion of their results.[139] By contrast, Baden and Coursey aggregate non-white, non-Black individuals in each unit of analysis, leaving both Black and white reference groups.[140] Similarly, Voorheis aggregates those non-white racial groups for which "[s]ample sizes are prohibitively small" but retains white, Hispanic, and Black as separate racial categories.[141]

The disaggregated studies seek to add nuance to their analysis. For example, Ash and Fetter, who included 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.[142]

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.[143] 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.[144] Chakraborty and Armstrong use a threshold of 20–25% depending on the buffer delineation method.[145] Not all studies identify a particular threshold—for example, Ringquist defines "minority neighborhoods" as those with an undisclosed percentage of non-white residents.[146]

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

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138 Throughout this Part, references to racial categories use the terminology of each respective author. Where referring to categories across studies, terms white, Black, Hispanic, and Asian and Pacific Islander (AAPI) are used.

139 *See, e.g.*, Arora & Cason, *supra* note 112, at 415–16 ("Our results indicate that a larger percentage of non-white residents may be associated with a higher level of releases.").

140 Baden & Coursey, *supra* note 114, at 71.

141 JOHN VOORHEIS, AIR QUALITY, HUMAN CAPITAL FORMATION AND THE LONG-TERM EFFECTS OF ENVIRONMENTAL INEQUALITY AT BIRTH 19 (2017).

142 Ash & Fetter, *supra* note 127, at 446.

143 *See, e.g.*, Chakraborty & Armstrong, *supra* note 111, at 152–53 ("The variable that is used to represent the racial composition of the population in these analyses is the percentage of non-whites, which includes the following census categories: black, American Indian or Alaskan Native, Asian or Pacific Islander, and other race."); *see also* John A. Hird & Michael Reese, *The Distribution of Environmental Quality: An Empirical Analysis*, 79 SOC. SCI. Q. 693, 699–700 (1998).

144 Hird, *supra* note 129, at 334.

145 Chakraborty & Armstrong, *supra* note 111, at 153.

146 *See* Evan J. Ringquist, *Equity and Distribution of Environmental Risk: The Case of TRI Facilities*, 78 SOC. SCI. Q. 811, 816 (1997) (using the term "minority neighborhood" but not providing a numerical criterion for that designation).

identify as one of the non-white census categories.[147] The authors then refer to units as non-white if the percentage is above a pre-determined threshold.[148]

The four studies in the second subcategory (13%) disaggregate the non-white populations into specific racial or ethnic groups. However, both Spina and Konisky include only the percentage of Blacks and Hispanics in each unit of analysis.[149] Brooks and Sethi track the percentage of each unit of analysis that is Black, Asian, and Native American.[150] 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.[151] Been uses a threshold of 50%, or the majority, referring to these units as "predominantly African American neighborhoods."[152]

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.[153] 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.[154]

The biggest outlier in defining race is the Sadd et al. study, which refers to disadvantaged communities as "minority urban areas."[155] The authors observe eleven characteristics: "percentage of minority (non-Anglo), African American, and Latino residents in each census tract; tract values of mean per capita income; median household income; median house value (self-reported); median contract rent; percentage of residents employed in manufacturing; percentage of tract used as residential land and industrial land; and population density."[156] 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."[157]

Table 2 summarizes the results for race and ethnicity.

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147 Chakraborty & Armstrong, *supra* note 111, at 152–53.

148 *See id.* (using the term "non-whites" to explain their findings alluding to some threshold needed).

149 Francesca Spina, *Environmental Justice and Patterns of State Inspections*, 96 SOC. SCI. Q. 417, 421 (2015); Konisky, *supra* note 128, at 111.

150 Brooks & Sethi, *supra* note 130, at 241.

151 Vicki Been, *Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?*, 103 YALE L. J. 1383, 1384, 1387, 1407 (1994).

152 *Id.* at 1394–95.

153 Jennifer Wolch et al., *Parks and Park Funding in Los Angeles: An Equity Mapping Analysis*, 26 URB. GEOGRAPHY 4, 15 (2005).

154 *Id.*

155 James L. Sadd et al., *"Every Breath You Take…": The Demographics of Toxic Air Releases in Southern California*, 13 ECON. DEV. ENV'T Q. 107, 108 (1999).

156 *Id.* at 110.

157 *Id.* at 111.

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 thirty-seven studies use socioeconomic status as an element in their examination of distributional consequences. The most prevalent 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 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.[158]

Studies in the second category similarly use the poverty rate 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.[159] Morello-Frosch and Jesdale use the poverty level for a four-person household, which was $12,647 in 1989.[160] 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

158 Rosofsky et. al, *supra* note 125.

159 *Poverty Thresholds*, U.S. CENSUS BUREAU, https://perma.cc/JU9R-DSU5 (last revised Oct. 8, 2021). Not all the studies within the second category indicate the household size used for the categorization. *See, e.g.*, Chakraborty & Armstrong, *supra* note 111, at 153; Warren Kriesel et al., *Neighborhood Exposure to Toxic Releases: Are There Racial Inequities?*, 27 GROWTH & CHANGE 479, 486 (1996) (using the poverty rate in each census block group to identify "the predominance of very poor" populations).

160 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 PERSPS. 386, 389 (2006).

poverty level to meet their most basic needs."[161] Banzhaf and Walsh divide communities into low and high income with a custom "boundary income."[162]

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, accounts for both the percentage of county residents below the federal poverty level and the unemployment rate.[163] In contrast, Casey et al. use an even broader set of additional variables: "low educational attainment," defined as the percent of adults age twenty-five years or older without a completed high-school education; "poverty," defined as a percentage of individuals with income below the U.S. Census Bureau poverty threshold based on family size; "civilian family unemployment," defined as the percentage of families with one or more unemployed members; the percentage of renters; and "linguistic isolation," defined as the percentage of households in which nobody aged fourteen or older speaks English "very well."[164] Defending this sort of broader accounting of socioeconomic factors, Bowen et al. points out that "[m]edian 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."[165]

One example in the "other category" is the Watkins and Gerrish study, which determines socioeconomic status based on the ratio of income of the wealthiest five percent of households to income of the poorest twenty percent of households.[166] The authors generated a binary indicator that equals one if a city's 95/20 ratio is lower than 9.7—the aggregate ratio for the 100 largest metro areas in 2014—and zero if it is higher.[167]

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

162 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).

163 Hird, *supra* note 129, at 335*; see* ANN WOLVERTON, EFFECTS OF SOCIO-ECONOMIC AND INPUT-RELATED FACTORS ON POLLUTING PLANTS' LOCATION DECISIONS 21 (2008) (examining plant location based on eleven variables, including poverty, defined as percent of persons living in poverty; income, defined as median household income; and unemployment, defined as percent of residents over the age of sixteen that are unemployed).

164 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 PERSPS. 1, 3 (2017).

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

166 SHANNON LEA WATKINS & ED GERRISH, THE RELATIONSHIP BETWEEN URBAN FORESTS AND RACE: A META-ANALYSIS, 209 J. ENV'T MGMT. 152, 164 (2018).

167 *Id.*

Table 3 summarizes the various approaches to determining socioeconomic status.

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 thirty-seven studies consider some measure of civic engagement,[168] which the studies refer to as "political empowerment,"[169] "political mobilization,"[170] or "propensity" for "collective action."[171] 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.[172] 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.[173] 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.[174]

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168 Throughout this Part, we will use "civic engagement" to capture this concept. This term is also used by Morello-Frosch & Jesdale, *supra* note 160, at 389 (defining civic engagement as "political influence and decision-making power").

169 *See, e.g.*, Pamela Davidson & Douglas L. Anderton, *Demographics of Dumping II: A National Environmental Equity Survey and the Distribution of Hazardous Materials Handlers*, 37 DEMOGRAPHY 461, 462 (2000) (referring to "the percentage of persons age 18 and older without a high school diploma (or equivalent) and the percentage of persons with at least one year of college education" as variables used "as proxies for community political empowerment").

170 *See, e.g.*, Hird, *supra* note 129, at 332 (referring to "the percentage of residents who are college educated, and the percentage of housing units that are owner-occupied"); Hird & Reese, *supra* note 143, at 701 (referring to "the percentage of housing that is owner occupied, the percentage of residents who have twelve or more years of education," and "the percentage of county residents who voted in the most recent presidential election" as variables used to measure potential and actual political mobilization, respectively).

171 *E.g.*, Brooks & Sethi, *supra* note 130, at 234.

172 *E.g.*, Morello-Frosch & Jesdale, *supra* note 160, at 389.

173 *See, e.g.*, Collins et al., *supra* note 134, at 4 ("Explanatory variables were selected to test alternative theoretical explanations for inequitable exposure to HAPs.").

174 *See, e.g.*, Hird & Reese, *supra* note 143, at 701 ("The political component suggests that 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.").

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. Studies that use more than one of these measures are categorized as "hybrid."

As a proxy for civic engagement, two studies (22%) use voter turnout,[175] 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."[176] By contrast, they suggest that local environmental organizing may be correlated with existing pollutant exposure, thus confounding any search for causation.[177]

Four studies (44%) use education level as a proxy for civic engagement. Davidson and Anderton measure the percentage of residents above eighteen without a high-school diploma and the percentage with at least one year of college education to determine community "political empowerment."[178] Rosofsky et al. use education attainment data from the Census Bureau's American Community Survey to define low-education individuals as those younger than twenty-five years old who have "less than a high school degree."[179] Shapiro uses education level to determine a community's "ability to overcome these informational barriers."[180] He identifies the percentage of the observed population that has only a grade-school diploma and those that have a college degree.[181] 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.'"[182]

One study (11%) by Collins et al. uses housing type to measure civic engagement.[183] 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."[184]

Finally, two studies (22%) use a hybrid approach, combining one or both voter turnout and education level categories. Hird looks at the

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175 Brooks & Sethi, *supra* note 130, at 243; Morello-Frosch & Jesdale, *supra* note 160, at 389.

176 Brooks & Sethi, *supra* note 130, at 243.

177 *Id.*

178 Davidson & Anderton, *supra* note 169, 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.

179 Rosofsky et al., *supra* note 125, at 83.

180 Shapiro, *supra* note 125, at 379–80.

181 *Id.* at 385.

182 Liévanos, *supra* note 126, at 586.

183 Collins et al., *supra* note 134, at 2, 5.

184 *Id.* at 5.

percentage of residents who are homeowners along with the percentage "who are college educated, and the percentage . . . who have lived in the same county" for more than a decade to identify counties that have "a stable, and presumably more politically motivated, citizenry."[185] Hird and Reese combine the percentage of owner-occupied homes, the percentage of residents with more than twelve years of education, and the percent of residents who voted in the previous presidential election.[186]

Table 4 summarizes the results for civic engagement.

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 thirty-eight studies primarily use one of three major approaches. The majority, twenty-four (63%), define disproportion as some inequity among units of analysis with regards to the exposure to the pollution in question. Four (11%) 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 defines disproportion simply as a significantly greater exposure to toxic releases, statistically speaking.[187] In these studies, a finding of a *correlation* between disproportion and some other element, such as race or socioeconomic status, is considered an injustice to be remedied, regardless of what might have caused the pattern.[188]

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 risk perceptions."[189]

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185 Hird, *supra* note 129, at 336.

186 Hird & Reese, *supra* note 143, at 701.

187 *See* Chakraborty & Armstrong, *supra* note 111, at 145 (explaining that exposure to toxic releases may be unevenly distributed within the United States).

188 *See* Kriesel et al., *supra* note 159, at 481 ("[A] statistical finding of aversive racism is that greater exposure to environmental risk is correlated with higher populations of racial minorities.").

189 Sadd et al., *supra* note 155, at 110.

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.[190] 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 shift in local demographics from a predominantly industrial, white region to a predominantly Black one.[191]

Finally, four studies do not fall into one of these first three categories. For example, Hird has a hybrid approach that looks at both disproportionate risk and proximity to Superfund sites.[192] 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.[193]

Table 5 summaries the results for disproportionate impact.

Table 5. Disproportionate Impact		
Categories	**Count**	**Percent**
Non-causal inequity	24	63%
Proximity	4	11%
Causal	6	16%
Other[194]	4	11%

The variety of methodologies employed for each of the variables discussed in this Part demonstrates that 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. Therefore, there is a significant risk that researchers can pick and choose from the methodological elements to reach predetermined results. In Part IV we

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190 *See* Baden & Coursey, *supra* note 114, at 61 (explaining how examination of the inter-temporal dynamics of siting, migration, and exposure improves upon previous research).

191 *Id.* at 61–67, 86.

192 *See* Hird, *supra* note 129, at 331–32, 334 (explaining the methodology used in the analysis).

193 *See* Sadd et al., *supra* note 155, at 108, 119 ("[W]e examine the patterns of proximity to environmental hazards by ethnicity and other variables.").

194 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., 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 161, at 81.

set forth considerations that should guide some of the methodological choices to reduce this risk.

IV. STANDARDIZATION

In an October 2020 report, Jason Schwartz argues that OIRA should convene an interagency working group 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."[195] "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,[196] is ultimately designed to standardize regulatory review practices.[197] Without such comparison, it 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. As discussed 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.[198]

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.[199] For example, stakeholders are likely to have important views on how to define the communities affected by particular environmental harms.

Nonetheless, this Part seeks 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.[200] We focus on three of the methodological elements discussed in the studies analyzed in Part III: unit of analysis, race and ethnicity,

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195 JASON SCHWARTZ, INST. FOR POL'Y INTEGRITY, ENHANCING THE SOCIAL BENEFITS OF REGULATORY REVIEW 12 (2020) (emphasis added).

196 CIRCULAR A-4, *supra* note 12, at 2.

197 *See id.* at 1 ("This Circular is designed to . . . standardiz[e] the way benefits and costs of Federal regulatory actions are measured and reported.").

198 *See supra* text accompanying notes 104–106.

199 SCHWARTZ, *supra* note 195; INST. FOR POL'Y INTEGRITY, COMMENTS ON AVENUES TO PROMOTE EQUITY AND ADVANCE ENVIRONMENTAL JUSTICE THROUGH RULEMAKING AND REGULATORY ANALYSIS 22 (July 6, 2021).

200 *See supra* text accompanying notes 39–45.

and socioeconomic status.[201] 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 III 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.[202] 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 the unit of analysis can be critically influential on reported outcomes.[203] A recent study examines these consequences "for the issue of energy use inequality in cities."[204] The authors find that their results vary significantly depending on the unit of analysis applied to measure inequality, like city blocks, census block groups, census tracts and zip codes.[205] Specifically, the authors find that when the data is aggregated, their metric of inequality decreases by up to 50%.[206] In other words, in larger units of analysis, they are less able to find inequality.

This problem is not new to researchers who study inequality. In 1997, Vicki Been and Francis Gupta wrote, "[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."[207] Been and Gupta explained their selection of census tracts for their study, which employs a longitudinal analysis of waste facility siting to determine what caused these facilities to be sited in communities with a disproportionate population of poor and minority residents.[208] Their article set forth four variables as key to the decision on the appropriate level of granularity:

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201 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 105.

202 *See supra* text accompanying notes 113–136.

203 *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) (describing the effects of using different units of analysis in measuring equity in the context of a regional landfill).

204 Rachel Nuwer, *Study Shows How Cities Can Consider Race and Income in Household Energy Efficiency Programs*, PRINCETON SCH. ENGINEERING & APPLIED SCI. (June 7, 2021) https://perma.cc/JNG5-JB26; *see* Kangkang Tong et al., *Measuring Social Equity in Urban Energy Use and Interventions Using Fine-Scale Data*, PROCEEDINGS NAT'L ACAD. SCIS., June 7, 2021, at 1.

205 *See* Tong et al., *supra* note 204, at 2.

206 *Id.* at 5.

207 Vicki Been & Francis Gupta, *Coming to the Nuisance or Going to the Barrios? A Longitudinal Analysis of Environmental Justice Claims*, 24 ECOLOGY L. Q. 1, 10–11 (1997).

208 *Id.* at 7–8.

cost, consistency over time, comparative use, and how communities self-identify.[209]

Regarding cost, Been and Gupta found that census tracts are preferable because federal agencies already collect many demographic and other important data at the tract level.[210] In contrast, the use of concentric circles produced by Geographic Information System (GIS) technology can be prohibitively expensive.[211] 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.[212]

As to the second variable, Been and Gupta noted that ensuring the unit of analysis is consistent over time is critical for any analysis that seeks to track changes over time.[213] While GIS circles are the most consistent unit over time, they are prohibitively expensive to use for large-scale studies.[214] Been and Gupta consider 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."[215]

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 "contain widely different numbers of people, and cover vastly different land areas."[216] Similarly, GIS circles,[217] 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 and Gupta argued that census tracts are superior because they "are set by local committees charged with reflecting exactly the kind

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209 *Id*. at 11–12. Baden & Coursey refer to this element as "local descriptive power." Baden & Coursey, *supra* note 114, at 59.

210 *See* Been & Gupta, *supra* note 207 (discussing the use of EPA data on TSDF locations and applying data from census tracts).

211 *Id.* at 11.

212 *See id.* ("[C]onverting 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.").

213 *See id.* at 13–14 (discussing the reconfiguration of census tracts due to Census Bureau changes).

214 *Id.* at 11.

215 *Id.*

216 *Id.* at 12*; see also* Brooks & Sethi, *supra* note 130, at 237–38, 240 (discussing the need to look at additional factors and distance-weighted sums of air emissions to reasonably measure pollution exposure for zip codes).

217 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 Injustice*, ENV'T RSCH. LETTERS, Nov. 18, 2015 at 1, 15–17.

of community sentiments and practices" a unit of analysis should capture.[218] 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.[219]

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.[220] Selecting a unit that is too large can lead to conclusions that do not remain valid in analyses of smaller sub-units.[221] 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.[222] For example, if the negative impacts of a hazardous waste site are confined to a 1,000-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 1,000-foot radius would be so diluted within a mile radius as to no longer be statistically significant. As a result, in comments submitted to 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 selecting the unit of analysis.[223] 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."[224]

But conversely, if the effects are felt for a mile, using a 1,000-foot radius might result in a sample that is so small that it would fail to reveal a statistically disproportionate impact.[225] 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.[226]

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218 Been & Gupta, *supra* note 207, at 11–12; *see also* Baden & Coursey, *supra* note 114, at 59 (noting the "local descriptive power" of census tracts).

219 Paul Mohai, *The Demographics of Dumping Revisited: Examining the Impact of Alternate Methodologies in Environmental Justice Research*, 14 VA. ENV'T L. J. 615, 639 (1995); *see also* Been & Gupta, *supra* note 207, at 11 (saying "census tracts are preferable" because they "are drawn up by local committees, and are intended to reflect the community's view of where one neighborhood ends and another begins").

220 *See* Zimmerman, *supra* note 203, at 645–54.

221 Mohai, *supra* note 219, at 619.

222 *See* Been, *supra* note 151, 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.").

223 INST. FOR POL'Y INTEGRITY, *supra* note 199, at 9.

224 *Id.*

225 *See* Been, *supra* note 151, at 1402 ("The disadvantages of . . . small units of analysis . . . are substantial.").

226 *See* Ash & Fetter, *supra* note 127, at 442–43 (discussing the importance of choosing a proper pollution indicator and unit of analysis).

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.[227] 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.[228]

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: "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."[229] 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.[230] And, while units could be customized, the costs might be too high for this approach to be viable.[231]

When revising Circular A-4, OMB should consider these challenges in fashioning its guidance on how agencies should choose a unit of analysis to determine 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,[232] 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

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227 Chakraborty & Armstrong, *supra* note 111, at 148.

228 *See, e.g.*, *A Fight over Cross-State Pollution*, *supra* note 68 (explaining that 93% of the air pollution in parts of Connecticut originated in upwind states).

229 Been, *supra* note 151, at 1402.

230 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." Konisky, *supra* note 128.

231 *See supra* text accompanying note 212 (suggesting that conforming data to such units would entail costly procedures).

232 *See supra* text accompanying notes 218–2219 (advocating that community sentiments and views are valuable in identifying units).

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 American. The studies discussed in Part III use each of these approaches.

The race and ethnicity categorizations in the study universe are almost all based upon census data.[233] The U.S. Census Bureau uses racial classifications pursuant to an OMB directive,[234] which outlines the standards for the collection and presentation of race data across the federal government.[235] 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.[236] The Census Bureau also includes a sixth category on its surveys: "Some Other Race."[237] The data is collected based on self-reporting and is thus meant to reflect *social* categories rather than "explicitly biological and/or genetic contexts."[238]

In addition to defining racial categories,[239] an important challenge in the analysis of race is to determine whether to aggregate data and, if so, how. Ash and Fetter point out that studies often group racial and ethnic minority populations in analysis.[240] As with using 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 allows for important nuance—across all U.S. cities, neighborhoods with more Black residents

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[233] 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., relied upon the United Church of Christ Commission for Racial Justice study, which itself attributes its demographic data to the U.S. Census Bureau. ROBERT D. BULLARD ET AL., UNITED CHURCH OF CHRIST, TOXIC WASTES AND RACE AT TWENTY 1987–2007, at x (2007), https://perma.cc/72T8-SQDE.

[234] Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity, 62 Fed. Reg. 58,782, 58,782 (Oct. 30, 1997).

[235] *See Race*, U.S. CENSUS BUREAU, https://perma.cc/HK2V-QCXU (last visited Nov. 9, 2021) (describing the OMB directive on race).

[236] *About Race*, U.S. CENSUS BUREAU, https://perma.cc/DV9V-9MTX (last updated Oct. 8, 2021).

[237] *Race*, *supra* note 235.

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

[239] 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 203, at 644. Even if researchers uniformly use the data collected by the U.S. 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), https://perma.cc/2H49-ZSJ4 (arguing that minority groups are undercounted). 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, 62 Fed. Reg. at 58,782.

[240] *See* Ash & Fetter, *supra* note 127, at 442 (examining correlations in geographically small units and Census block groups).

experienced higher air pollution than neighborhoods that are predominantly white *or* predominantly Hispanic.[241]

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 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,[242] slicing the data too thinly might be problematic as well. It could be, for example, that disproportionate impacts on certain non-white groups are not statistically significant when looking at individual groups but become statistically significant due to 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 III take a variety of approaches to defining socioeconomic status, with the most common approach using some measure of poverty, household income, or a combination of the two.[243] However, some studies integrate other information beyond measures of income, such as including level of education, form of housing, and employment.[244]

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.[245] The Joint Committee on Taxation, the Internal

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241 *Id.*

242 *See supra* text accompanying notes 220–2226 (describing issues to consider when choosing a unit of analysis).

243 *See supra* text accompanying notes 158–1167.

244 *See supra* text accompanying notes 163–1165.

245 Wallace, *supra* note 8, at 501.

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.[246] 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.[247] As compared to quintiles, deciles allow for the analysis of more disaggregated information, which, as discussed above,[248] 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.

But variables beyond income, particularly education and wealth, are relevant measures of socioeconomic status. Several of the studies discussed in Part III use education at least as a partial determinant of such status, for example, incorporating "low educational attainment," i.e., the percent of adults age twenty-five years or older without a completed high-school education, into their measure for socioeconomic status.[249] 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.[250] 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 III, there is 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.[251] Moreover, there is a more dramatic, unequal distribution of wealth than of income in the United States.[252] As

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246 *Id.* at 501–02.

247 OFF. OF TAX ANALYSIS, U.S. DEP'T OF THE TREASURY, DISTRIBUTION OF FAMILIES, CASH INCOME, AND FEDERAL TAXES UNDER 2019 CURRENT LAW (2018).

248 *See supra* text accompanying notes 223–2224.

249 *See supra* text accompanying notes 163–1165.

250 *See* Ann Owens, *Income Segregation Between School Districts and Inequality in Students' Achievement*, 91 SOCIO. EDUC. 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. PERSPS. 79, 87–88 (2013) (stating that a U.S. college graduate earned approximately 70% more than a high school graduate as of 2013); David H. 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 thirty years).

251 *See* Linda Sugin, *Tax Expenditures, Reform, and Distributive Justice*, 3 COLUM. J. TAX L. 1, 27 (2011).

252 *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).

of 2012, the top 0.1% of Americans owned as much wealth as the bottom 90%.[253] 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."[254]

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 process.

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.

V. THE WAY FORWARD

As this 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 III and IV, 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.

Part V.A discusses how the consideration of alternatives needs to play a central role in distributional analysis. Part V.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 12866, instead of being incorporated into the cost-benefit analysis through equity weights or otherwise. And Part V.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.

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253 *See* Berch Berberoglu, *The Nature, Extent and Sources of Wealth and Income Inequality in the United States*, 43 INT'L REV. MOD. SOCIO. 193, 198 (2017).

254 *Id.* at 194–95.

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."[255] Second, they "should identify the potential benefits and costs for each alternative and its timing."[256]

The reason why the consideration of alternatives is so important is that Executive Order 12866 requires not only the benefits of a regulation "justify" its costs[257] but also that agencies "select those approaches that maximize net benefits,"[258] 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 know whether Alternative A maximizes net benefits or 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."[259]

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 or 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

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255 OFF. OF INFO. & REGULATORY AFFAIRS, OFF. OF MGMT. & BUDGET, REGULATORY IMPACT ANALYSIS: A PRIMER 5 (AUG. 15, 2011), https://perma.cc/6FFR-AN6D*; see also* CIRCULAR A-4, *supra* note 12, at 7.

256 OFF. OF INFO. & REGULATORY AFFAIRS, *supra* note 255, at 7.

257 Exec. Order No. 12,866, 3 C.F.R. 638, 639 (Oct. 4, 1993).

258 *Id.* at 638.

259 CIRCULAR A-4, *supra* note 12, at 10.

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 with higher net benefits than the others. But it is customary, in cost-benefit analysis, for an agency to at least consider a more stringent alternative and a less stringent alternative to the alternative selected.[260]

As shown in Part II, while EPA considered alternatives in the cost-benefit analysis of significant rules promulgated by the Obama administration, it did not do so for the distributional analysis.[261] 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."[262] 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."[263]

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 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 the Clinton and Obama executive orders and the Biden presidential memorandum.[264]

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260 *See* Michael A. Livermore & Richard L. Revesz, *Rethinking Health-Based Environmental Standards*, 89 N.Y.U. L. Rev. 1184, 1237 (2014).

261 *See supra* text accompanying notes 75, 85, 102.

262 OFF. OF INFO. & REGULATORY AFFAIRS, *supra* note 255, at 3.

263 CIRCULAR A-4, *supra* note 12, at 14.

264 *See supra* text accompanying notes 46–47.

Moreover, unless the distributional consequences of various alternatives are 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.[265]

As Part II shows, this work was not done for any of the Obama administration's most significant environmental regulations.[266] The failure is particularly striking because, in Executive Order 13563, the Obama administration underscored its commitment to consider "distributive impacts" and "equity" in regulatory analyses, and in Executive Order 13653, it stressed, more generally, the importance of taking environmental justice concerns into account in government actions.[267]

This discussion highlights that for the laudable goals on distributional matters embodied in President Biden's 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 happens.

B. Relationship Between Distributional Analysis and Cost-Benefit Analysis

There are two generally accepted ways to combine the results of distributional analysis with those of cost-benefit analysis.[268] 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.[269] Part V.C discusses how tradeoffs of this sort might be evaluated.

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265 CIRCULAR A-4, *supra* note 12, at 2–3.

266 *See supra* text accompanying notes 64–103.

267 *See supra* text accompanying notes 46–51.

268 For discussion of a broader set of approaches, see INST. FOR POL'Y INTEGRITY, *supra* note 199, at 17.

269 While this Part 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 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 (recommending a rule change or mitigation measures where repeated regulation has put a group's livelihood or health at risk). This is one reason why standardization is important: so that agency and OIRA staff can compare distributional analyses across rules.

In contrast, in the second approach, distributional consequences are taken into account by incorporating them directly into a social welfare function. The social welfare functions typically used in 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.[270] For example, an extra $1,000 in the hands of a 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 a policy that gives the money to the destitute person instead of to Bezos more desirable.

Unlike a social welfare function of this sort, traditional cost-benefit analysis values $1,000 equally, regardless of who gets it. The policy that gives the $1,000 to the destitute person could nonetheless be preferred.[271] 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, there is no accepted methodology in the United States for determining the shape of the function, though other countries, particularly the United Kingdom, have some experience.[272] 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 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

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270 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://perma.cc/8VPN-T6N2.

271 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* Daniel Hemel, *Regulation and Redistribution with Lives in the Balance* 16–17 (U. Chi., Pub. Law Working Paper No. 767, 2021), https://perma.cc/3RJQ-HP84 (stating that cost-benefit analysis should be used to consider practical consequences and not made to justify subjective preferences).

272 HER MAJESTY'S TREASURY, THE GREEN BOOK: CENTRAL GOVERNMENT GUIDANCE ON APPRAISAL AND EVALUATION 97 (2020).

education and health.[273] As a result, the necessary scientific support for justifying such functions might currently be lacking.

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.[274] There is simply no accepted methodology for how to assign weight based on racial classifications in a social welfare function. Moreover, doing so would raise thorny constitutional problems. For example, in *Gratz v. Bollinger*,[275] the Supreme Court struck down preferences granted to racial groups based on a mathematical formula.[276] 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.[277]

Fourth, a number of judicial decisions have called regulations into question if their monetized costs outweighed their benefits. Most prominently, in *Michigan v. EPA*,[278] the Supreme Court determined that "[n]o regulation is 'appropriate' if it does significantly more harm than good."[279] In this respect, the courts are familiar with regulatory impact analyses that are performed pursuant to Executive Order 12866, 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,[280] 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 12866, President Obama's Executive Order 12563, and the George W. Bush administration's Circular A-4. Simply implementing a procedure already approved by presidents of both

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273 For an example of such work, see Maddalena Ferranna et al., *Addressing the COVID-19 Pandemic: Comparing Alternative Value Frameworks* 19, 56 (Nat'l Bureau of Econ. Rsch., Working Paper No. 28601, Mar. 2021), https://perma.cc/TB66-UQPR (describing how COVID-19 vaccinations could result in herd protection against hospital acquired infections, increased school attendance, and higher education attainment).

274 *See supra* text accompanying notes 32–33 (explaining EPA findings that racial minorities are disproportionately impacted by environmental issues).

275 539 U.S. 244 (2003).

276 *See id.* at 279 (concluding that a public university admissions process that allocates points based on race violates the Equal Protection Clause).

277 *See* Vitolo v. Guzman, 999 F.3d 353, 356 (6th Cir. 2021) (striking down a COVID-19 relief policy that considered gender and race); Faust v. Vilsack, 519 F. Supp. 3d 470, 473 (E.D. Wis. 2021) (blocking a loan forgiveness program based on the race of the applicant).

278 576 U.S. 743 (2015).

279 *Id.* at 752.

280 *See* Jacob M. Schlesinger, *Biden's Hurdle: Courts Dubious of Rule by Regulation; Executive Orders and Agency Edicts Are Important to a President Facing a Polarized Congress, but Judges Show Increasing Skepticism–Which Conservatives Hope to Harness*, WALL ST. J. (Mar. 2, 2021), https://perma.cc/T2UT-4NVP (explaining that President Biden faces a formidable task in promulgating some regulations in part because the judiciary is skeptical of regulation).

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 under the presidential memorandum on Modernizing Regulatory Review while undoing a significant number of Trump administration policies and launching its own ambitious agenda in a variety of areas.[281] 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 output will be undone by a subsequent administration of the opposite party.[282] 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 requires distributional analysis to 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 decision-making, 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 be compromised in order to achieve the more attractive distributional outcome? The amount has to be bounded, or cost-benefit analysis would become a 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

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[281] *See* Exec. Order No. 14,008, 86 Fed. Reg. 7619, 7619 (Feb. 1, 2021); Exec. Order No. 13,990, 86 Fed. Reg. 7037, 7037 (Jan. 25, 2021) (providing two instances of President Biden's overhaul of Trump-era environmental policies).

[282] Bethany A. Davis Noll & Richard L. Revesz, *Regulation in Transition*, 104 MINN. L. REV. 1, 65 (2019).

the lack of accepted techniques.[283] Unquantified benefits, however, have a place in cost-benefit analyses, and decision-makers are required to take them into account. Executive Order 12866 requires agencies to assess "qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider."[284] 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."[285] Not only have the courts upheld agency reliance on unquantified benefits, but they have struck down agency decisions, particularly during the Trump administration, for ignoring unquantified benefits.[286]

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 are 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 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."[287] And its command that agencies consider "values such as equity, human dignity, fairness, potential distributive impacts,"[288] indicates 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 be 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.

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283 Richard L. Revesz, *Quantifying Regulatory Benefits*, 102 CAL. L. REV. 1423, 1425, 1436, 1443–44 (2014) (providing examples of certain unquantifiable benefits that agencies have struggled to account for in cost-benefit analysis). Over time, however, as science evolves, previously unquantifiable consequences can be quantified. *Id.* at 1425, 1436.

284 Exec. Order No. 12,866, 3 C.F.R. 638, 638 (1993).

285 CIRCULAR A-4, *supra* note 12, at 27.

286 *See* Richard L. Revesz, *Destabilizing Environmental Regulation: The Trump Administration's Concerted Attack on Regulatory Analysis*, 47 ECOLOGY L. Q. 887, 899–903 (2020) (providing examples of discounting of unquantified benefits or costs by Trump's EPA).

287 OFF. OF INFO. & REGULATORY AFFAIRS, *supra* note 255, at 3.

288 *Id.*

VI. 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 the production of detailed guidance to agencies on how they should conduct distributional analysis through a standardized protocol. Absent such standardization, it will not be possible to credibly determine 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 with 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.