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REGULATORY IMPACT ANALYSES OF ENVIRONMENTAL JUSTICE EFFECTS

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I. INTRODUCTION

The environmental justice movement was launched in 1982, when residents of Warren County, N.C., protested the construction of a hazardous waste landfill in their predominantly African-American community.[1] Minority communities' sense that such hazardous facilities are found disproportionately in their communities was soon borne out by two landmark studies by the United States General Accounting Office (GAO) in 1983[2] and the United Church of Christ in 1987.[3] Since then, research has shown consistently that poor and minority households tend to live in more polluted neighborhoods. This correlation appears to be quite robust to the statistical methods employed and to the type of pollution considered, including hazardous waste facilities, landfills, large air

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1. For an introduction to the topic, including these historical origins, see generally ROBERT D. BULLARD, DUMPING IN DIXIE: RACE, CLASS, AND ENVIRONMENTAL QUALITY (2d ed. 1994) [hereinafter BULLARD, DUMPING IN DIXIE].

2. UNITED STATES GEN. ACCOUNTING OFFICE, SITING OF HAZARDOUS WASTE LANDFILLS AND THEIR CORRELATION WITH RACIAL AND ECONOMIC STATUS OF SURROUNDING COMMUNITIES (1983) [hereinafter GAO REPORT].

3. UNITED CHURCH OF CHRIST, COMM'N FOR RACIAL JUSTICE, TOXIC WASTES AND RACE IN THE UNITED STATES (1987).

polluters, and the concentration of air pollutants.[4] In short, the correlation qualifies as a "stylized fact" as much as anything in social science.

This finding of a disproportionate environmental burden borne by the poor and by people of color motivated President Clinton to issue Executive Order (EO) 12898.[5] Still in force, the order requires nondiscrimination in federal environmental programs and focuses federal resources, such as the United States Environmental Protection Agency's (EPA's) Brownfields Program, on low-income and minority communities.[6] EPA defines environmental justice as

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4. For the classic studies on the location of landfills and hazardous waste facilities, see generally ROBERT D. BULLARD ET AL., UNITED CHURCH OF CHRIST, TOXIC WASTES AND RACE AT TWENTY: 1987-2007 (2007); UNITED CHURCH OF CHRIST, *supra* note 3; GAO REPORT, *supra* note 2. For more recent work, see generally BENJAMIN A. GOLDMAN & LAURA FITTON, TOXIC WASTES AND RACE REVISITED (1994); Brett M. Baden & Don L. Coursey, *The Locality of Waste Sites within the City of Chicago: A Demographic, Social, and Economic Analysis,* 24 RESOURCE & ENERGY ECON. 53 (2002); Vicki Been, *Locally Undesirable Land Uses in Minority Neighborhoods: Disproportionate Siting or Market Dynamics?,* 103 YALE L.J. 1383 (1994). On the proximity of large polluters, see generally H. Spencer Banzhaf, Joshua Sidon & Randall P. Walsh, *Environmental Gentrification and Discrimination, in* THE POLITICAL ECONOMY OF ENVIRONMENTAL JUSTICE (H. Spencer Banzhaf ed., forthcoming July 2012); Evan J. Ringquist, *Equity and the Distribution of Environmental Risk: The Case of TRI Facilities,* 78 SOC. SCI. Q. 811 (1997); James L. Sadd et al., *"Every Breath You Take…": The Demographics of Toxic Air Releases in Southern California*, 13 ECON. DEV. Q. 107 (1999); Ann Wolverton, *The Role of Demographic and Cost-Related Factors in Determining Where Plants Locate — A Tale of Two Texas Cities, in* THE POLITICAL ECONOMY OF ENVIRONMENTAL JUSTICE (H. Spencer Banzhaf ed., forthcoming July 2012). On the emissions of air pollutants, see generally Seema Arora & Timothy N. Cason, *Do Community Characteristics Influence Environmental Outcomes? Evidence from the Toxics Release Inventory*, 65 S. ECON. J. 691 (1999); Nancy Brooks & Rajiv Sethi, *The Distribution of Pollution: Community Characteristics and Exposure to Air Toxics*, 32 J. ENVTL. ECON. & MGMT. 233 (1997). On estimated air pollution concentrations, see generally 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 (2004); Rachel Morello-Frosch, Manuel Pastor & James Sadd, *Environmental Justice and Southern California's "Riskscape": The Distribution of Air Toxics Exposures and Health Risks among Diverse Communities,* 36 URB. AFF. REV. 551 (2001). For the classic book-length introduction to the literature over-all, see generally BULLARD, DUMPING IN DIXIE, *supra* note 1. For more recent reviews and discussion of this literature, see generally THE POLITICAL ECONOMY OF ENVIRONMENTAL JUSTICE (H. SPENCER BANZHAF ed., forthcoming July 2012); William Bowen, *An Analytical Review of Environmental Justice Research: What Do We Really Know?*, 29 ENVTL. MGMT. 3 (2002); Douglas S. Noonan, *Evidence of Environmental Justice: A Critical Perspective on the Practice of EJ Research and Lessons for Policy Design*, 89 SOC. SCI. Q. 1153 (2008); Evan J. Ringquist, *Assessing Evidence of Environmental Inequities: A Meta-Analysis,* 24 J. POL'Y ANALYSIS & MGMT. 223 (2005); Evan J. Ringquist, *Environmental Justice: Normative Concerns, Empirical Evidence, and Government Action*, *in* ENVIRONMENTAL POLICY: NEW DIRECTIONS FOR THE TWENTY-FIRST CENTURY 239 (Norman J. Vig & Michael E. Kraft eds., 6th ed. 2006).

5. Exec. Order No. 12,898, 59 Fed. Reg. 7,629 (Feb. 11, 1994).

6. *See* UNITED STATES ENVTL. PROT. AGENCY, ADDRESSING ENVIRONMENTAL JUSTICE IN EPA BROWNFIELDS COMMUNITIES (2009), *available at* http://epa.gov/brownfields/policy/ej_brochure_2009.pdf; UNITED STATES ENVTL. PROT. AGENCY, FINAL GUIDANCE FOR INCORPORATING ENVIRONMENTAL JUSTICE CONCERNS IN EPA'S NEPA COMPLIANCE ANALYSES (1998), *available at* http://www.epa.gov/region1/ej/pdfs/ej_guidance_nepa_epa0498.pdf [hereinafter EPA GUIDANCE].

> the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.[7]

This interpretation predominantly situates environmental justice within the larger concept of procedural justice, in which EPA's rulemaking and enforcement processes must be fair and open to the participation of all. But EPA's interpretation also hints at the goal of distributive justice, according to which the distribution of environmental quality should be fair and equitable.[8]

In practice, however, it is impossible to consider the environmental justice order in isolation. After all, it is but one in a series of executive orders that have shaped the promulgation of environmental regulations. Perhaps the most important was President Reagan's EO 12291, which required a Regulatory Impact Analysis (RIA), including an economic analysis of benefits and costs, for all major federal rules.[9] President Clinton's EO 12866 revised this order in some respects, emphasizing the non-quantitative effects of rules as well, but maintained the benefit-cost requirement for all "economically significant" rules, defined as those having costs greater than $100 million.[10] More recently, President Obama has affirmed these principles in his EO 13563.[11] These orders have implicitly made economic efficiency a criterion for evaluating potential actions to protect the environment. Historically, such efficiency

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7. United States Envtl. Prot. Agency, *Environmental Justice*, EPA.GOV, http://www.epa.gov/environmentaljustice/index.html (last visited Feb. 6, 2012) [hereinafter EPA, *Environmental Justice*].

8. But note EPA's aspiration that "everyone enjoys the same degree of protection" is subtly distinct from "enjoys the same level of environmental quality." *Id.* Government agencies are not in the business of promising utopia. On the tentative steps taken here toward a concept of distributive justice, see generally Matthew D. Adler, *Risk Equity: A New Proposal,* 32 HARV. ENVTL. L. REV. 1 (2008). For a more general discussion of the relationship between environmental justice and these more fundamental notions of justice, see generally Sheila Foster, *Justice from the Ground Up: Distributive Inequities, Grassroots Resistance, and the Transformative Politics of the Environmental Justice Movement*, 86 CALIF. L. REV. 775 (1998).

9. Exec. Order No. 12,291, 46 Fed. Reg. 13,193, 13,193-94 (Feb. 17, 1981).

10. Exec. Order No. 12,866, 58 Fed. Reg. 51,735, 51,735, 51,738 (Sept. 30, 1993).

11. Exec. Order No. 13,563, 76 Fed. Reg. 3,821 (Jan. 21, 2011).

considerations have carried much more weight than other considerations, including environmental justice.[12]

The environmental justice and benefit-cost executive orders, like the underlying policy objectives of fairness and efficiency that respectively motivate them, interact in important ways. For example, RIAs are a crucial part of the opportunity for public participation, providing critical information on the benefits and costs of proposed rules. Yet EPA's standard practice, like that of other agencies, is to document only *aggregate* benefits and costs, to whomsoever they may accrue. This article argues that expanding RIAs to include information on the *distribution* of benefits and costs of regulatory actions would provide environmental justice communities (and other communities too) with crucial information they need to participate fully in the process. Accordingly, providing such information would enhance procedural justice.

By the same token, documenting distributional effects in RIAs would provide the information agencies need to choose rules that would foster environmental equity as well as efficiency, enhancing distributive justice. Although such distributional effects are routinely omitted from benefit-cost analyses, both President Clinton's EO 12866 and President Obama's more recent EO 13563 have explicitly called for them to be included in such analyses, and there is in fact ample precedent for doing so. Thus, the over-arching theme of this article is that, far from necessarily being at loggerheads, the environmental justice and benefit-cost executive orders can mutually interact to improve environmental policy-making.

This article begins by exploring environmental justice objectives as they have been incorporated into RIAs to date. It suggests that these objectives have been too limited. In particular, it concludes that EPA's emphasis on providing *negative assurance* that its programs do not exacerbate environmental justice concerns hampers its ability to consider environmental justice factors in many regulatory settings. In addition, EPA's focus on environmental justice considerations at discrete "sites" and the surrounding local "communities" limits the domain in which environmental justice considerations come into play. Recognizing these limitations, the EPA has recently pledged to integrate environmental

12. For discussion of the role of this benefit-cost requirement in environmental regulations, see generally CASS R. SUNSTEIN, THE COST-BENEFIT STATE: THE FUTURE OF REGULATORY PROTECTION (2002); ENVIRONMENTAL POLICY UNDER REAGAN'S EXECUTIVE ORDER: THE ROLE OF BENEFIT-COST ANALYSIS (V. Kerry Smith ed., 1984); REFORMING REGULATORY IMPACT ANALYSIS (Winston Harrington et al. eds., 2009); Robert W. Hahn, Sheila M. Olmstead & Robert N. Stavins, *Environmental Regulation in the 1990s: A Retrospective Analysis,* 27 HARV. ENVTL. L. REV. 377 (2003).

justice considerations into the "fabric" of its activities to develop regulatory actions.[13]

The paper argues that a more fruitful approach would simply be to think in terms of distributional impacts. In particular, RIAs should compute the benefits and costs of an action on specific demographic groups, as well as the aggregate benefits and costs. Crucially, costs, including indirect costs, must be documented as well as benefits, as they are every bit as relevant for the welfare of affected groups.

II. ENVIRONMENTAL JUSTICE OBJECTIVES AND REGULATORY ACTIONS

EPA has stated that it "will work to ensure that environmental justice is incorporated into the Agency's regulatory process"[14] and more recently that it will integrate environmental justice considerations into the "fabric" of its regulatory activities.[15] Of course, conducting a RIA is an integral part of the regulatory process, yet in comparison to the prodigious opportunities for incorporating environmental justice into an RIA, EPA's vision appears to be quite limited. EPA's *Environmental Justice Strategy* begins a statement of its objectives by stating: "No segment of the population, regardless of race, color, national origin, or income, *as a result of EPA's policies, programs, and activities*, suffers disproportionately from adverse human health or environmental effects . . . ."[16] That is, EPA appears to be focused more on avoiding exacerbating environmental justice concerns than on alleviating pre-existing concerns. In other words, first do no harm.[17]

Unfortunately, when it has incorporated even these limited environmental justice objectives into its RIAs, EPA has tended to stop at perfunctory, pro forma assertions that it is not creating or

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13. UNITED STATES ENVTL. PROT. AGENCY, EPA'S ACTION DEVELOPMENT PROCESS: INTERIM GUIDANCE ON CONSIDERING ENVIRONMENTAL JUSTICE DURING THE DEVELOPMENT OF AN ACTION 3-5 (2010), *available at* http://www.epa.gov/environmentaljustice/resources/policy/considering-ej-in-rulemaking-guide-07-2010.pdf [hereinafter EPA ACTION DEVELOPMENT GUIDE].

14. UNITED STATES ENVTL. PROT. AGENCY, THE EPA'S ENVIRONMENTAL JUSTICE STRATEGY 15 (1995), *available at* http://www.epa.gov/compliance/ej/resources/policy/ej_strategy_1995.pdf [hereinafter EPA JUSTICE STRATEGY].

15. EPA ACTION DEVELOPMENT GUIDE, s*upra* note 13.

16. *Id.* at 3 (emphasis added).

17. It might be argued that this focus is found in EO 12,898 itself, which mandates that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects *of its programs, policies, and activities* on minority populations and low-income populations." Exec. Order No. 12,898, 59 Fed. Reg. 7,629, 7,629 (Feb. 11, 1994) (emphasis added). However, as discussed *infra*, in the context of the benefit-cost executive orders, EO 12,898 can be read as providing a basis for more positive steps.

exacerbating an environmental injustice. For example, the RIA for arsenic in drinking water consists of these meager 116 words:

> Executive Order 12898 establishes a Federal policy for incorporating environmental justice into Federal agency missions by directing agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Executive Order requires the Agency to consider environmental justice issues in the rulemaking and to consult with Environmental Justice (EJ) stakeholders.
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> The Agency has considered environmental justice related issues concerning the potential impacts of this regulation and has determined that there are no substantial disproportionate effects. Because the arsenic rule applies to all community water systems, the majority of the population, including minority and low-income populations will benefit from the additional health protection.[18]

An only slightly expanded treatment is given in the RIA for disinfection byproducts.[19] These recent RIAs have not even documented this absence of harm, but instead have only given negative assurance that no evidence of harm has come to EPA's attention. Thus, even if EPA confines itself to the objective "do no harm," there is room for improved documentation, for moving from "negative assurance" to "positive assurance" that it is doing no harm.

One reason for moving beyond simply asserting negative assurance toward actually documenting the distributional effects of an action is that it would facilitate informed citizen involvement and comment. Again, the importance of this involvement was emphasized in EO 12898 itself, which emphasizes that agency strategies for environmental justice should,

> *at a minimum*: (1) promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations; (2) ensure greater public par-

18. UNITED STATES ENVTL. PROT. AGENCY, PROPOSED ARSENIC IN DRINKING WATER RULE: REGULATORY IMPACT ANALYSIS § 8.9 (2000), *available at* http://yosemite.epa.gov/ee/epa/ria.nsf/vwAN/A200012B.pdf/$file/A200012B.pdf [hereinafter EPA, ARSENIC RIA].

19. UNITED STATES ENVTL. PROT. AGENCY, ECONOMIC ANALYSIS FOR THE FINAL STAGE 2 DISINFECTANTS AND DISINFECTION BYPRODUCTS RULE § 8.10 (2005), *available at* www.epa.gov/safewater/disinfection/stage2/pdfs/anaylsis_stage2_ecconomic_main.pdf [hereinafter EPA, ECONOMIC ANALYSIS FOR DISINFECTANTS].

> ticipation; (3) improve research and data collection relating to the health of and environment of minority populations and low-income populations; and (4) identify differential patterns of consumption of natural resources among minority populations and low-income populations.[20]

EPA likewise recognized the role of public participation when it noted that environmental justice requires the "meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development . . . of environmental laws, regulations, and policies."[21] Its *Environmental Justice Strategy* elaborates, "[t]hose who live with environmental decisions—community residents, State, Tribal, and local governments, environmental groups, businesses—must have every opportunity for public participation in the making of those decisions. An informed and involved community is a necessary and integral part of the process to protect the environment."[22] Of course, to be full partners in decision making, these groups must have access to relevant data about the effects of these environmental actions, as EPA also recognizes: "EPA will work with affected communities, State, Tribal, and local governments, and others to have the best possible information available to identify and address disproportionately high and adverse human health or environmental effects on minority populations and low-income populations."[23]

Surely, the "best possible information" would include data on the distributional effects of a policy. Again, EPA seemingly recognizes this when it writes: "EPA will collect, analyze, and disseminate data that will compare environmental and human health risks to populations identified by race, national origin, or income."[24] But what could be more appropriate than to incorporate this information directly into its RIAs, which provide the critical information for both technical analysis of and public comment on proposed rules?

But there is also good reason to move beyond this defensive posture. "First do no harm" has always been wise counsel, but Hippocrates would never have had much of a medical career if his practice had ended there. Like the physician who acts to enhance his patient's health, EPA (or any federal regulatory agency) takes actions to achieve national objectives. As explicitly embodied in benefit-cost analysis, one of those objectives is to maximize an

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20. 59 Fed. Reg. at 7,630 (emphasis added).
21. EPA, *Environmental Justice*, *supra* note 7.
22. EPA JUSTICE STRATEGY, *supra* note 14, at 3.
23. *Id.* at 10.
24. *Id.* at 11.

aggregation of individuals' welfare. But in addition to this efficiency objective, a more equitable distribution of welfare is also a social objective in our society.

Accordingly, the analysis in an RIA should provide the information needed to design regulations with equity in mind as well as efficiency. There is ample precedent for doing so. Of course, EO 12898 does not explicitly require distributional analysis in RIAs, but the actions it specifically mentions are characterized as a *minimum* requirement of federal agencies.[25] Because RIAs are a crucial source for public comment, by stressing the public participation of all groups in the development of environmental regulations, the order implicitly requires the documentation of such effects in RIAs.

As previously noted, RIAs are governed primarily by benefit-cost orders.[26] But this overlap poses no problem; to the contrary, the environmental justice rationale for documenting distributional effects actually reinforces pre-existing precedents for doing so within benefit-cost analysis, taken on its own terms. Most recently, President Obama's recent EO 13563, issued January 18, 2011, requires the benefit-cost principle include "distributive impacts and equity."[27] This fulfills his earlier call to Office of Management and Budget (OMB) to produce a set of recommendations for a new Executive Order, with attention to "the role of distributional considerations, fairness, and concern for the interests of future generations."[28] President Obama was not the first to make this call. In setting forth a "statement of regulatory philosophy and principles," President Clinton's Executive Order 12866 included, "distributive impacts" and "equity" as part of benefits, broadly construed, and President Bush left this order intact. [29]

In calling for equity considerations to be folded into benefit-cost analysis, these last three presidents have made explicit a principle that has been implicit in the United States federal government for many years. The EPA's benefit-cost guidance documents recognize the importance of distributional considerations however it rarely incorporates them in practice.[30]

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25. *See supra* text accompanying note 20.

26. *See supra* text accompanying note 12.

27. Exec. Order No. 13,563, 76 Fed. Reg. 3,821, 3,821 (Jan. 21, 2011).

28. REFORMING REGULATORY IMPACT ANALYSIS, *supra* note 12, at 12.

29. Exec. Order No. 12,866, 58 Fed. Reg. 51,735, 51,735 (Sept. 30, 1993). Amendments to EO 12,866 by President Bush left this language intact. *See* Exec. Order No. 13,258, 67 Fed. Reg. 9,385 (Feb. 26, 2002) *and* Exec. Order No. 13,422, 72 Fed. Reg. 2,763 (Jan. 18, 2007), *revoked by* Exec. Order 13,497, 74 Fed. Reg. 6,113 (Jan. 30, 2009).

30. UNITED STATES ENVTL. PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES § 11.1.4 (2010), *available at* http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf.

More substantively, the United States Water Resource Council has long allowed, though not required, effects on the income distribution to be included in benefit-cost analyses of water projects, and the OMB approved this practice at least as early as 1983.[31] For example, OMB has recommended that "[w]hen benefits and costs have significant distributional effects, these effects should be analyzed and discussed, along with the analysis of net present value."[32] It elaborates:

> Analysis should aim at identifying the relevant gainers and losers from policy decisions. Effects on the preexisting assignment of property rights by the program under analysis should be reported. Where a policy is intended to benefit a specified subgroup of the population, such as the poor, the analysis should consider how effective the policy is in reaching its targeted group.[33]

Thus, the principle of incorporating distributional considerations into the United States' benefit-cost analysis does not arise for the first time with the question of environmental justice.

Nor is the United States government alone in adopting this principle. Indeed, other nations, like the United Kingdom, have incorporated distributional issues into benefit-cost analysis much more effectively.[34] Furthermore, academic experts in benefit-cost analysis have called for this approach for decades,[35] and they

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31. UNITED STATES WATER RES. COUNCIL, ECONOMIC AND ENVIRONMENTAL PRINCIPLES AND GUIDELINES FOR WATER AND RELATED LAND RESOURCES IMPLEMENTATION STUDIES § 1.4.9 (1983), *available at* http://www.usace.army.mil/CECW/Documents/pgr/pg_1983.pdf; OFFICE OF MGMT. & BUDGET, BUDGET CIRCULAR NO. A-94 REVISED (1992), *available at* http://www.whitehouse.gov/omb/circulars_a094/.

32. OFFICE OF MGMT. & BUDGET, *supra* note 31, § 10.

33. *Id.* § 10(a).

34. *See* H.M. TREASURY, THE GREEN BOOK: APPRAISAL AND EVALUATION IN CENTRAL GOVERNMENT 24-25, 91-96 (2003), *available at* http://www.hm-treasury.gov.uk/d/green_book_complete.pdf.

35. For a history of efforts to incorporate distributional effects in the academic literature, see generally H. Spencer Banzhaf, *Objective or Multi-objective? Two Historically Competing Visions for Benefit-Cost Analysis,* 85 LAND ECON. 3 (2009) [hereinafter Banzhaf, *Objective or Multi-objective?*]. For specific early instances of academic experts and practitioners of benefit-cost analysis incorporating distributional effects, see for example, PARTHA DASGUPTA ET AL., GUIDELINES FOR PROJECT EVALUATION (1972); ROBERT H. HAVEMAN, WATER RESOURCE INVESTMENT AND THE PUBLIC INTEREST (1965); ARTHUR MAASS ET AL., DESIGN OF WATER-RESOURCE SYSTEMS: NEW TECHNIQUES FOR RELATING ECONOMIC OBJECTIVES, ENGINEERING ANALYSIS, AND GOVERNMENTAL PLANNING (1962); Burton A. Weisbrod, *Income Redistribution Effects and Benefit-Cost Analysis, in* PROBLEMS IN PUBLIC EXPENDITURE ANALYSIS 177 (Samuel B. Chase, Jr. ed., 1968); A. Myrick Freeman III, *Income Distribution and Planning for Public Investment*, 57 AM. ECON. REV. 495 (1967) [hereinafter Freeman, *Income Distribution*]; A. Myrick Freeman III, *Six Federal Reclamation Projects and the Distribution of Income,* 3 WATER RESOURCES RES. 319 (1967) [hereinafter Freeman, *Six Federal Reclamation Projects*]; Arnold C. Harberger, *On the Use of Distributional Weights in Social Cost-Benefit Analysis,* 86 J. POL. ECON. S87 (1978).

continue to endorse it.[36] All these authorities—political, academic, and historical—have understood that documenting distributional effects is essential for understanding the effect of regulatory actions on all policy objectives, including distributional ones as well as efficiency. The relative newer objective of environmental justice only reinforces the importance of documenting these effects, both for the sake of public participation and, ultimately, for the design of regulations.

III. DIFFUSING THE SITUATION

EPA's approach to environmental justice is limited in another respect as well. In particular, it has tended to focus mainly on local environmental problems, discrete in space. For example, EPA's *Environmental Justice Strategy* and its *Toolkit for Assessing Potential Allegations of Environmental Injustice* speak in terms of "major facilities" and "sites."[37] It also emphasizes activities such as brownfields remediation, the permitting of hazardous waste facilities under the Resource Conservation and Recovery Act (RCRA), or the permitting of air emissions under the Clean Air Act.[38]

This focus is understandable, for since its origins in the 1982 protests in Warren County, N.C. over hazardous waste siting and in the early research of Robert Bullard on solid waste siting in Houston, the three pillars supporting environmental justice—activism, research, and policy—have traditionally focused on discrete sources of pollution to be found at specific points in space.[39] This local perspective greatly simplifies questions about

36. *See, e.g.*, REFORMING REGULATORY IMPACT ANALYSIS, *supra* note 12; Adler, *supra* note 8; Kenneth J. Arrow et al., *Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?*, 272 SCI. 221, 222 (1996); John D. Graham, *Saving Lives Through Administrative Law and Economics*, 157 U. PA. L. REV. 395, 524-26 (2008); Olof Johansson-Stenman, *Distributional Weights in Cost-Benefit Analysis—Should We Forget about Them?*, 81 LAND ECON. 337 (2005) [hereinafter Johansson-Stenman, *Distributional Weights*]; Olof Johansson-Stenman, *On the Value of Life in Rich and Poor Countries and Distributional Weights Beyond Utilitarianism,* 17 ENVTL. & RESOURCE ECON. 299 (2000) [hereinafter Johansson-Stenman, *On the Value of Life*].

37. EPA JUSTICE STRATEGY, *supra* note 14, at 10-11; UNITED STATES ENVTL. PROT. AGENCY, TOOLKIT FOR ASSESSING POTENTIAL ALLEGATIONS OF ENVIRONMENTAL INJUSTICE *passim* (2004), *available at* www.epa.gov/compliance/ej/resources/policy/ej-toolkit.pdf [hereinafter EPA TOOLKIT].

38. EPA JUSTICE STRATEGY, *supra* note 14, at 12-14, 16-21; EPA TOOLKIT, *supra* note 37, *passim*. There are some exceptions: for example, in addition to brownfields cleanup and enforcement of pollution permits, EPA's environmental justice demonstration projects include abatement of lead in paint and plumbing and general education programs. EPA JUSTICE STRATEGY, *supra* note 14, at 16-21.

39. The first generation of research in the 1980s, following the Warren Co. episode, followed up with examinations of communities near hazardous waste facilities. *See* GAO REPORT, *supra* note 2; UNITED CHURCH OF CHRIST, *supra* note 3. Soon after, the second generation of studies in the 1990s looked largely at large polluters listed in the Toxics Release

the appropriate spatial scale of analysis, though it by no means eliminates them.[40]

But this local approach is also limiting, making it difficult to think about diffuse pollutants, widely dispersed through the water or air. And many—perhaps most—pollutants fall into this category. Even when released from point sources, many pollutants disperse through water or air. Examples include municipal water supplies contaminated with disinfectants or disinfection byproducts or both, which disperse throughout the service area, and the long-range transport of air pollutants like fine particulates and ozone. Other pollutants are widely dispersed even at the point of emissions. Examples include air pollution from mobile sources and pathogens like cryptosporidium and giardia from livestock operations. Arsenic in drinking water is a particularly striking example, as it may enter water supplies through groundwater contaminated by arsenic occurring naturally in soil and rock, as well as from industry and agriculture.[41] Such pollutants range from EPA's historical priorities (pathogens in drinking water, criteria air pollutants) to more recent concerns (disinfection byproducts, air toxics).

And, in fact, the academic literature has long moved on from the bread-and-butter work of comparing the demographics around RCRA facilities, TRI facilities, or similar discrete sites. For example, Michael Ash and Robert Fetter have compared the distribution of modeled concentrations of air toxics—that is an entire spatial surface of pollution—to the distribution of demographic groups across space.[42] Similarly, others have compared the spatial distribution of ozone, a criteria air pollutant, to the spatial distribution of demographic groups.[43]

Environmental justice considerations are still relevant to such diffuse pollutants because there will still be spatial variation in the effects of the action—spatial variation which may be correlated with demographics. Such correlations may arise for at least three

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Inventory. *See, e.g.*, Arora & Cason, *supra* note 4; Brooks & Sethi, *supra* note 4; Sadd et al., *supra* note 4.

40. *See generally* Douglas L. Anderton et al., *Environmental Equity: The Demographics of Dumping*, 31 DEMOGRAPHY 229 (1994); Brett M. Baden, Douglas S. Noonan & Rama Mohana R. Turaga, *Scales of Justice: Is There a Geographic Bias in Environmental Equity Analysis?*, 50 J. ENVTL. PLAN. & MGMT. 163 (2007); Paul Mohai & Robin Saha, *Reassessing Racial and Socioeconomic Disparities in Environmental Justice Research*, 43 DEMOGRAPHY 383 (2006).

41. U.S. Envtl. Prot. Agency, *Basic Information about the Arsenic Rule*, EPA.GOV, www.epa.gov/environmentaljustice/index.html (last visited Feb. 6, 2012).

42. Ash & Fetter, *supra* note 4.

43. Brooks Depro & Christopher Timmins, *Residential Mobility and Ozone Exposure: Challenges for Environmental Justice Policy*, *in* THE POLITICAL ECONOMY OF ENVIRONMENTAL JUSTICE (H. Spencer Banzhaf ed., forthcoming July 2012); Florenz Plassmann & Neha Khanna, *Household Income and Pollution: Implications for the Debate about the Environmental Kuznets Curve Hypothesis*, 15 J. ENV'T & DEV. 22 (2006).

reasons. First, the action may affect pollution differently in different locations, and those effects may be spatially correlated with demographic patterns. Second, even if the effects of an action on pollution levels were uniform in space, other spatial differences may imply differences in the actual outcomes of interest. For example, if the concentration-response function relating pollution levels to health effects or other impacts is non-linear, then variation in background levels of pollution may result in different effects of even a uniform change in pollution. (For instance, there may be no effect of a decrease in pollution if it is already below a threshold.) Similarly, differences in background weather or climate may interact with a given change in pollution to produce differential effects. Or, differences in local residents' opportunities to avoid or mitigate pollution may imply different effects from a given change in pollution. For example, access to mass transit, air conditioning, or health care may differ across space. If these opportunities interact with pollution levels in important ways, and if they are correlated in space with demographics, then again the impact of an action may differ across groups.

Third and finally, even with identical changes in pollution and identical background conditions, different groups may have differential responses to a given change in pollution because of something about the group itself. Such group-level responses could arise from genetic differences, differences in economic conditions, differences in background health and nutrition, or any combination of the three. Sometimes there is evidence of such differential impacts on sensitive subgroups like children or women of childbearing age, but typically our understanding of concentration-response relationships is insufficient to document differential effects.

The differential effects of concern in the context of environmental justice have always been for particular groups of people: low-income and minority populations, including African-Americans, Hispanics, Asian-Americans, and Native Americans.[44] But traditionally, environmental justice analysts and researchers have taken their logical unit of analysis to be the "community," located in a fairly confined place. For example, one might define a community which is proximate to a hazardous waste facility or that is surrounded by a number of pollution sources. One might then look for a suitable "reference community" for purposes of

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44. Naturally, the self-claimed goal (and title) of EO 12,898 itself is "To Address Environmental Justice in Minority Populations and Low-Income Populations." Exec. Order No. 12,898, 59 Fed. Reg. 7,629 (Feb. 11, 1994). For EPA's definition of "minority" in this context, see EPA TOOLKIT, *supra* note 37, at 17, 44.

comparison. One then looks at the demographic groups living in these communities.[45]

In the context of dispersed pollutants, it is better to reverse this logic. That is, the logical unit of analysis should be the group itself. One would then analyze the effects of an action on different groups, partly as a function of the communities in which they live. Put in these terms, incorporating environmental justice considerations into RIAs boils down to assessing the distributional impacts of an action. And such distributional considerations have a long history in benefit-cost analysis.[46] To be sure, environmental justice is a specific instance of such distributional analyses, one focused on environmental applications and on the demographic groups that have been identified by previous environmental justice research, by the communities themselves, and by agency guidance as being most at risk or facing the greatest cumulative burden of exposure to pollution. But as it is a special case of this wider issue, environmental justice analysts have the advantage of being able to tap into this larger literature.

One common argument against incorporating distributional effects into benefit-cost analysis is that government projects and regulations should be based only on efficiency, while distributional considerations should be dealt with in other policy settings, especially the tax code, welfare programs, and so forth. This perspective is implicit in the Kaldor-Hicks potential compensation tests commonly invoked in benefit-cost analysis, which 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.[47] Similarly, it is implicit in Richard Musgrave's three-branch theory of government (allocation, distribution, stabilization), as enshrined in his classic textbook on public finance.[48] It is also implicit in more modern work on optimal taxation, in which distributional effects are considered around the optimum.[49]

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45. For this approach in the classic studies, see for example, BULLARD, DUMPING IN DIXIE, *supra* note 1; GAO REPORT, *supra* note 2; UNITED CHURCH OF CHRIST, *supra* note 3; Been, *supra* note 4. For this approach in EPA's guidance, see for example, EPA TOOLKIT, *supra* note 37, at 58-63.

46. *See* sources cited s*upra* notes 34-36.

47. *See* J. R. Hicks, *The Foundations of Welfare Economics*, 49 ECON. J. 696 (1939); Nicholas Kaldor, *Welfare Propositions of Economics and Interpersonal Comparisons of Utility*, 49 ECON. J. 549 (1939).

48. *See generally* RICHARD A. MUSGRAVE, THE THEORY OF PUBLIC FINANCE (1959).

49. *See, e.g.*, Aanund Hylland & Richard Zeckhauser, *Distributional Objectives Should Affect Taxes but not Program Choice or Design*, 81 SCANDINAVIAN J. ECON. 264 (1979); Louis Kaplow, *On the (Ir)Relevance of Distribution and Labor Supply Distortion to Government Policy*, 18 J. ECON. PERSP. 159 (2004).

To this argument there are two rejoinders. First, actual compensations for the distributional effects of government projects and regulations are exceedingly rare, if not an outright fiction. At any rate, the tax system is far from optimal, so any regulatory action that effects a desirable transfer in more efficient ways than is being done through the tax code should be given credit for this achievement.[50] Second, as Stephen Marglin has argued, socially we care not only about the size of the pie and its distribution, but also the *method* of slicing it. Many would prefer to see a disadvantaged group aided through jobs or environmental protection than through the dole, for example.[51] The simplest way of making the point is that if redistribution is a national objective, then any regulatory action that promotes this objective, ceteris paribus, is obviously preferable to one that does not.

Perhaps the best example of recent work incorporating distributional issues into benefit-cost analyses of environmental regulations is work by Ronald Shadbegian, Wayne Gray, and Cynthia Morgan on the distributional effects of the sulfur dioxide trading program enacted in the 1990 Clean Air Act Amendments.[52] They compute estimated changes in particulate matter, and the consequent changes in mortality, at the county level. Using a model of the United States electricity sector and its costs of abating pollution,[53] they compute control costs at the state level.[54] Then, assuming that costs are passed on to consumers and that all households consume the same amount of electricity, they compute per-capita costs at the state level.[55] Finally, they compute estimated net benefits by different demographic groups, including African-Americans, Hispanics, and the poor.[56] More recently, other researchers have undertaken a still more detailed distributional analysis of the highway diesel fuel rule, but do not consider benefits and costs.[57]

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50. *See* Joel Slemrod & Shlomo Yitzhaki, *Integrating Expenditure and Tax Decisions: The Marginal Cost of Funds and the Marginal Benefit of Projects*, 54 NAT'L TAX J. 189 (2001).

51. Stephen A. Marglin, *Objectives of Water-Resource Development: A General Statement, in* DESIGN OF WATER-RESOURCE SYSTEMS: NEW TECHNIQUES FOR RELATING ECONOMIC OBJECTIVES, ENGINEERING ANALYSIS, AND GOVERNMENTAL PLANNING 17-18, 66-67 (1962).

52. Ronald J. Shadbegian et al., *Benefits and Costs from Sulfur Dioxide Trading: A Distributional Analysis*, *in* ACID IN THE ENVIRONMENT: LESSONS LEARNED AND FUTURE PROSPECTS (Gerald R. Visgilio & Diana M. Whitelaw eds., 2007).

53. *See* A. DENNY ELLERMAN ET AL., CTR. FOR ENERGY & ENVTL. POLICY RESEARCH, EMISSIONS TRADING UNDER THE U.S. ACID RAIN PROGRAM: EVALUATION OF COMPLIANCE COSTS AND ALLOWANCE MARKET PERFORMANCE (1997).

54. Shadbegian et al., *supra* note 52, at 249-55.

55. *Id.* at 252-53.

56. *Id.* at 254-55.

57. Ellen Post et al., *Distributional Benefit Analysis of a National Air Quality Rule*, 8 INT'L J. ENVTL. RES. & PUB. HEALTH 1872 (2011). For the original RIA of the diesel rule, see UNITED STATES ENVTL. PROT. AGENCY, REGULATORY IMPACT ANALYSIS: HEAVY DUTY ENGINE AND VEHICLE STANDARDS AND HIGHWAY DIESEL FUEL SULFUR CONTROL REQUIRE-

Many of EPA's RIAs are already detailed enough, and make use of scientific and economic models sufficiently rich enough, that extending them to incorporate such distributional issues would require only modest additional effort. EPA's RIA for its arsenic rule and its disinfectants and disinfection byproducts rule are cases in point.[58] For example, in the arsenic RIA, EPA identified a distribution of costs across individual water treatment systems (from under 100 people served to over 1 million).[59] In some cases, individual systems were modeled; in others, it categorized systems by statistical distributions. EPA considered the capital and operating costs of achieving a proposed arsenic standard using various treatment technologies, given background arsenic levels at each system. It then computed the least-cost method for individual facilities to achieve a standard, given background arsenic levels. These costs reflect the economies of scale enjoyed by larger facilities as well as the distribution of background arsenic levels.[60] Similarly, EPA determined benefits for its arsenic rule based on the population, by age category, exposed to various levels of arsenic. This combination of exposures and exposed populations implied the number of cases of bladder cancer that could be expected with and without the regulation.[61]

With these data and with this conceptual architecture, EPA essentially has already approached a distributional analysis in the style of Shadbegian et al.. It simply did not follow through to break them out and report them in the same way. In particular, once EPA had determined benefits and costs by water treatment systems, virtually all the steps needed to compute costs and benefits by demographic group were completed. All that would remain to be done would be to determine who lives in each of those systems, a small additional step in light of the tremendous amount of work that was done in the analysis.[62]

MENTS (2000), *available at* http://epa.gov/otaq/highway-diesel/regs/2007-heavy-duty-highway.htm.

58. EPA, ARSENIC RIA, *supra* note 18; EPA, ECONOMIC ANALYSIS FOR DISINFECTANTS, *supra* note 19.

59. EPA, ARSENIC RIA, *supra* note 18, § 6.2.5.

60. *See* EPA, ARSENIC RIA, *supra* note 18, § 6.

61. *See id.* § 5.

62. EPA individually modeled only the water treatment facilities serving the largest populations. Smaller facilities were characterized by a statistical distribution. This lowers the accuracy of both the estimated aggregate benefits as well as potentially estimated distributional effects, but in principle does not make it harder to extend the analysis to the latter, so long as the locations of the set of facilities in the statistical analysis are known.

IV. DISTRIBUTION OF WHAT?

A. General Considerations

How best to incorporate distributional effects into RIAs will depend on the distributional objectives. More equity, ceteris paribus, may be desirable, but equity of what? Of exposure to a particular contaminant (arsenic, say, in the case of the arsenic rule, or disinfection byproducts for the Stage 2 rule)? Of environmental health generally? Or, most generally, overall welfare? In some respects, this is a false choice. We care about environmental health *because* it affects overall welfare.

Accordingly, the most fundamental distributional objective is equity in welfare. Because it is the most fundamental, it is this objective that should guide our thinking about incorporating environmental justice considerations into RIAs. This conclusion may seem counterintuitive. After all, does not the "environmental" in "environmental justice" imply a concern about equity in environmental health per se? Actually, not necessarily. Instead, we can interpret it as implying a concern about the environment *insofar as* it affects overall welfare.

Indeed, focusing on more narrow types of equity could well result in counterintuitive and unintended, even perverse, decision rules for policy. Suppose, for example, that there is some particular environmental contaminant which minorities are actually less exposed to than whites. Suppose further that a particular regulatory action under consideration turns out to reduce the environmental concentrations of this contaminant, with reductions especially large in the minority communities.[63] If the underlying objective motivating distributional analyses were equity in a particular contaminant, the RIA would have to down-weight the net benefits of this action on the grounds that it helped the minority group! This is hardly a move toward greater justice if the minority group is otherwise disadvantaged. The problem, of course, lies in the mischaracterization of the objective. If the objective were instead greater equity in overall welfare, the benefit-cost analysis of this regulation would over-weight the net benefits of the action for its preferential treatment of the minority group.

To say that we are concerned with the distribution of overall welfare is a start, but other questions about what constitutes welfare soon follow. An early step of any RIA is to identify the potential impacts of an action which need to be analyzed. Similarly, an

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63. Though this scenario is unlikely in most cases, it might well happen for some particular contaminant. In any case, I propose it only as a thought experiment.

early step of any benefit-cost analysis is to identify those impacts to be monetized. Should all of those effects be of interest for any distributional analysis? The relevant effects will differ on a case-by-case basis, but four general issues warrant discussion, two on the cost side and two on the benefit side.

B. Cost-side Considerations

First, and most important, it is essential to emphasize that overall welfare includes costs as well as benefits. Thus, it is not sufficient to look at the distribution of gross environmental benefits. It is the distribution of *net benefits* that is of ultimate interest. Wherever possible, RIAs should document the distributional effects of net benefits, as in the work by Shadbegian et al. on the Clean Air Act amendments.[64] As an alternative, it may be sufficient to separately document the distribution of benefits and costs. As noted above, OMB specifically mentions costs as well as benefits when discussing distributional effects.[65] Moreover, EPA has recognized the importance of costs within an expansive framework for understanding environmental justice.[66] In particular, EPA's *Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* urges "consideration of the distribution of costs to pay for environmental projects," as when there are user fees, for example.[67] It also notes that populations intended to benefit from regulations may rely on polluting industries for jobs and tax revenue, so that they may experience economic costs indirectly.[68]

C. Indirect Costs

The importance of jobs and the local tax base to citizens' welfare leads directly to the second issue, namely, indirect effects transmitted through markets (or, in the economist's jargon, so-called "general equilibrium" effects). Wherever possible, such effects should be considered in RIAs of dispersed pollutants. This recommendation does not follow simply from a commitment to thoroughness. It follows from research showing the importance of general equilibrium effects on the distribution of net benefits.[69] For

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64. Shadbegian et al., *supra* note 52.
65. OFFICE OF MGMT. & BUDGET, *supra* note 31, § 10.
66. EPA GUIDANCE, *supra* note 6, § 2.3, Exhibit 3.
67. *Id.*
68. *Id.*
69. *See generally* DON FULLERTON, DISTRIBUTIONAL EFFECTS OF ENVIRONMENTAL AND ENERGY POLICY (Don Fullerton ed., 2009).

example, the indirect effects of a regulatory action on welfare through land markets may be particularly important. Because pollution is undesirable, the demand for housing in a polluted neighborhood is lower than in a clean neighborhood, lowering housing values. Poor people may live in these neighborhoods because they cannot afford to purchase more expensive housing in cleaner locations.[70] This is not to say that they do not value a clean environment as much as richer households. But because of their limited income, their willingness to pay for a clean environment is lower. The reverse of this logic is that when neighborhoods improve, demand increases and housing values rise. But housing prices may rise by *more* than existing residents' values for the environment, as richer gentrifying households bid up housing values by their own higher willingness to pay for the improvement. If the incumbent residents owned their home, they would of course reap the capital gains from these appreciating housing values. But in the United States, eighty-three percent of people living in poverty and receiving public assistance are renters.[71] These residents would have to pay higher rents, and the increase in these rents may more than offset the direct benefit they receive from the environmental improvement.[72]

My colleagues and I have called this process "environmental gentrification."[73] In empirical work examining air quality improvements in Los Angeles, we show that incorporating these general equilibrium effects significantly alters the distribution of net benefits of air quality improvements, with renters in those communities which began as the most polluted, but which saw the

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70. This raises the possibility that disadvantaged groups sometimes "come to the nuisance," as opposed to polluting facilities coming to their neighborhoods. For evidence on both sides of this debate, see Baden & Coursey, *supra* note 4; H. Spencer Banzhaf & Randall P. Walsh, *Do People Vote with their Feet? An Empirical Test of Tiebout's Mechanism*, 98 AM. ECON. REV. 843 (2008); Been, *supra*, note 4; Vicki Been with Francis Gupta, *Coming to the Nuisance or Going to the Barrios? A Longitudinal Analysis of Environmental Justice Claims,* 24 ECOLOGY L.Q. 1 (1997); Depro & Timmins, *supra* note 43; Manuel Pastor, Jr., Jim Sadd & John Hipp, *Which Came First? Toxic Facilities, Minority Move-in, and Environmental Justice*, 23 J. URB. AFF. 1 (2001); Wolverton, *supra* note 4. Also, see generally H. Spencer Banzhaf & Eleanor McCormick, *Moving Beyond Cleanup: Identifying the Crucibles of Environmental Gentrification, in* THE POLITICAL ECONOMY OF ENVIRONMENTAL JUSTICE (H. Spencer Banzhaf ed., forthcoming July 2012).

71. *See* U.S. Census Bureau, *American FactFinder*, CENSUS.GOV, http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml (last visited Feb. 6, 2012).

72. *See* sources cited *supra* note 70. For a more whimsical take on this issue, see Armen A. Alchian, *The Beneficiaries of Cleaner Air*, *in* THE COLLECTED WORKS OF ARMEN A. ALCHIAN, PROPERTY RIGHTS AND ECONOMIC BEHAVIOR 145 (Daniel K. Benjamin ed., 2d vol. 2006).

73. Holger Sieg et al., *Estimating the General Equilibrium Benefits of Large Changes in Spatially Delineated Public Goods*, 45 INT'L ECON. REV. 1047, 1074 (2004); Banzhaf & McCormick, *supra* note 70.

greatest improvement in air quality, being harmed the most.[74] In extensions of this work re-examining benefit-cost analyses of the Clean Air Act, we show that these effects have tremendous importance for the relative winners and losers of actual environmental policies.[75] Far from being only of academic interest, these gentrification effects have been identified by the National Environmental Justice Advisory Commission (NEJAC) as an important unintended consequence of some environmental policies, such as brownfields redevelopment.[76]

Land markets are not the only avenue for important general equilibrium effects with distributional implications. Compliance costs fall on firms and thence the owners of capital, who are generally rich, but some of those costs may be passed on through higher prices. For example, the Clean Air Act has substantially raised the price of energy-intensive goods.[77] If energy-intensive goods are consumed disproportionately by the poor, the distribution of costs could be regressive. Moreover, if regulatory actions work through cap-and-trade-style permit markets, they produce assets with marketable value. If those assets are given to firms (as when pollution permits are grandfathered), they create new sources of wealth for the owners of capital (primarily the rich). Consequently, regulatory actions with grandfathered permits, such as the United States' SO_2 trading program, appear to be quite regressive when the indirect effects of asset prices and output prices are considered. The poor bear the burden of higher electricity prices, while the wealthy, through their ownership of capital, receive the rents from the permit allocation.[78]

The importance of such general equilibrium effects for benefit-cost analysis has been recognized by OMB. OMB notes:

> Individuals or households are the ultimate recipients of income; business enterprises are merely intermediaries.

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74. Sieg et al., *supra* note 73.

75. V. Kerry Smith et al., *General Equilibrium Benefits for Environmental Improvements: Projected Ozone Reductions under EPA's Prospective Analysis for the Los Angeles Air Basin*, 47 J. ENVTL. ECON. & MGMT. 559 (2004); *see also* Corbett A. Grainger, *The Distributional Effects of Pollution Regulations: Rental Housing and Air Quality Improvements* (Jan. 14, 2010) (unpublished manuscript, Job Market Paper), *available at* http://www.econ.gatech.edu/files/seminars/Grainger_Rents.pdf.

76. NAT'L ENVTL. JUSTICE ADVISORY COUNCIL, UNINTENDED IMPACTS OF REDEVELOPMENT AND REVITALIZATION EFFORTS IN FIVE ENVIRONMENTAL JUSTICE COMMUNITIES 1 (2006), *available at* http://www.epa.gov/environmentaljustice/resources/publications/nejac/redev-revital-recomm-9-27-06.pdf.

77. *See* Michael Hazilla & Raymond J. Kopp, *Social Cost of Environmental Quality Regulations: A General Equilibrium Analysis*, 98 J. POL. ECON. 853, 870-71 (1990).

78. *See* Lawrence H. Goulder & Ian W.H. Parry, *Instrument Choice in Environmental Policy,* 2 REV. ENVTL. ECON. & POL'Y 152, 155-59, 164-66 (2008); Ian W.H. Parry, *Are Emissions Permits Regressive?,* 47 J. ENVTL. ECON. & MGMT. 364, 377-80 (2004).

> Analyses of distribution should identify economic incidence, or how costs and benefits are ultimately borne by households or individuals.
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> Determining economic incidence can be difficult because benefits and costs are often redistributed in unintended and unexpected ways. For example, a subsidy for the production of a commodity will usually raise the incomes of the commodity's suppliers, but it can also benefit consumers of the commodity through lower prices and reduce the incomes for suppliers of competing products. A subsidy also raises the value of specialized resources used in the production of the subsidized commodity. As the subsidy is incorporated in asset values, its distributional effects can change.[79]

In any case, the key point is that once we accept the objective to be overall welfare, then all channels by which a regulatory action significantly affects welfare should be documented in an RIA.

Whether the most important general equilibrium effects are to be found in land markets, product markets, or labor markets, or whether they are important at all, will differ from case to case. Land markets and gentrification may be particularly important for the traditional case of locally undesirable land uses and large point sources of pollution. Because they are so obviously observed by residents, these sources of pollution are easily incorporated into the demand for land, and hence into land prices. But some widely dispersed pollution, like the criteria air pollutants, are also fairly easy to observe and have been shown to affect property values.[80]

D. Inter-group Heterogeneity in Values

To these two cost-side considerations about what constitutes overall welfare we can add two benefit-side considerations. The third issue to consider is group-level heterogeneity in willingness to pay for health and environmental improvements. Providing a clean environment, like any other good, comes at the cost of other private or public goods that could have been provided with those resources. Determining the right balance between environment-

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79. OFFICE OF MGMT. & BUDGET, *supra* note 31, § 10(b).

80. *See* Patrick Bayer, Nathaniel Keohane & Christopher Timmins, *Migration and Hedonic Valuation: The Case of Air Quality,* 58 J. ENVTL. ECON. & MGMT. 1 (2009); Kenneth Y. Chay & Michael Greenstone, *Does Air Quality Matter? Evidence from the Housing Market,* 113 J. POL. ECON. 376 (2005); Grainger, *supra* note 75; V. Kerry Smith & Ju-Chin Huang, *Can Markets Value Air Quality? A Meta-Analysis of Hedonic Property Value Models*, 103 J. POL. ECON. 209 (1995).

al improvements and costs is the objective of RIA. But different groups may be willing to make those tradeoffs differently, perhaps because of differences in their ability to pay, because of their differential access to other substitutes, or because of differences in preferences.

Introducing heterogeneity in willingness to pay into benefit-cost analysis seemingly poses a dilemma. On the one hand, we should not impose costs on one group that it is not willing or able to bear in order to achieve some benefit that another group desires. To the contrary, we do the greatest justice to groups when we honor their ability to set their own priorities.[81] On the other hand, allowing for heterogeneity in willingness to pay for benefits appears to discriminate against groups with lower valuations, biasing benefit-cost analysis toward rules that favor other groups. The backlash against the "senior death discount" for age-adjusted willingness to pay to avoid mortality risks is an example of that perception.[82] Such a concern is entirely valid for the standard benefit-cost regime without distributional weights. But it is *not* valid for generalized benefit-cost analysis with such weights. Indeed, this distinction might be viewed as the best argument for why distributional weights are necessary to give benefit-cost analysis more integrity.

Consider a hypothetical example of two policies that will save lives. Suppose further, the average value of a statistical life (VSL) is $6 million, but the VSL of the rich is $8 million and the VSL of the poor, because of their lower income, is $4 million. By virtue of the very fact of what it means to be poor, the poor cannot afford to pay as much money to reduce risks to their health and safety without foregoing other basic needs, while the rich can make such purchases while only foregoing luxuries. That is, these differences can be driven by the differences in ability to pay, even if preferences or "tastes" are the same.

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81. *See, e.g.*, Foster, *supra* note 8, at 802-07 (emphasizing as an example the importance of "sovereignty" for Native Americans).

82. On the controversy, see Katharine Q. Seelye & John Tierney, *E.P.A. Drops Age-Based Cost Studies*, N.Y. TIMES, May 8, 2003, http://www.nytimes.com/2003/05/08/us/epa-drops-age-based-cost-studies.html. On the economic and empirical basis for such discounts, see generally Joseph E. Aldy & W. Kip Viscusi, *Age Differences in the Value of Statistical Life: Revealed Preference Evidence*, 1 REV. ENVTL. ECON. & POL'Y 241 (2007); Mary F. Evans & V. Kerry Smith, *Do We Really Understand the Age-VSL Relationship?,* 28 RES. & ENERGY ECON. 242 (2006); Alan Krupnick, *Mortality-Risk Valuation and Age: Stated Preference Evidence*, 1 REV. ENVTL. ECON. & POL'Y 261 (2007); W. Kip Viscusi & Joseph E. Aldy, *Labor Market Estimates of the Senior Discount for the Value of Statistical Life*, 53 J. ENVTL. ECON. & MGMT. 377 (2007). For a critique of this practice, see Lisa Heinzerling, *The Rights of Statistical People,* 24 HARV. ENVTL. L. REV. 189, 192-94 (2000). For a rejoinder, see Graham, *supra* note 36.

Consider now two policies, Policy A and Policy B, that save lives. Details of the two policies are illustrated respectively in Tables 1A and 1B *infra*. The tables show that both policies impose gross costs of $1.7 billion on the rich but nothing on the poor. Policy A saves 100 statistical lives of the rich and 200 statistical lives of the poor, for a total of 300 statistical lives. Policy B saves 200 lives of the rich and 50 lives of the poor, for a total of only 250 lives. Both policies cost the same, yet Policy A saves more lives. Using the average VSL of $6 million implies aggregate net benefits of $100 million for Policy A, compared to an aggregate loss of $200 million for Policy B. Because it saves more lives at the same cost, Policy A must look better using this approach. If we use heterogeneous values, however, Policy A would generate -$900 million in net benefits for the rich and only $800 million in net benefits for the poor, for an aggregate loss of $100 million. Policy B would generate -$100 million in net benefits for the rich and $200 million in net benefits for the poor, for a net gain of $100 million in aggregate. Policy B has higher net benefits. Thus, using heterogeneous values, the efficiency criterion seemingly steers us to Policy B because it saves more rich lives. This would seem to imply that socially, we would trade 100 lives of the poor for 50 lives of the rich. Nothing could be less just or more reprehensible.

Yet in fact, *the supposed choice of Policy B does not follow from using heterogeneous VSLs per se, but only from doing so without distributional weights*. Giving greater weight to the net benefits of the poor would have steered us back to Policy A, which intuitively is the right choice.[83] Why use heterogeneous VSLs if we are going to undo them with the distributional weights? The reason can be made clear with the following example.

Consider two different policies, Policy C and Policy D, illustrated respectively in Tables 1C and 1D, *infra*. Both policies cost $700 million, but the split is $350 for rich and poor alike for Policy C, whereas with Policy D the split is $600 million for the rich and $100 million for the poor. Both policies save 150 lives, but Policy C saves 100 of the 150 from the rich, while Policy D saves 100 of the 150 from the poor. Using homogenous VSLs of $6 million, we see that the aggregate net benefits of both policies are $200 million. Using the efficiency criterion alone, the two policies appear to be tied. Looking next at distributional considerations, we would say that Policy C is better, because compared to Policy D it results in a

83. More precisely, a precise relationship between the social welfare of utilities of the rich and poor, respectively, the value of money to the rich and poor, and the value of avoiding risks to the rich and poor can be identified that would just offset one another so as to generate equal VSLs. However, this relationship need not hold in practice. *See* Johansson-Stenman, *On the Value of Life*, *supra* note 36, at 304.

costless transfer of $50 million from the rich to the poor. Policy C looks more favorable, so using these criteria we would choose it over Policy D. But this is the wrong conclusion. When we consider the groups' true VSLs, we now see that *both groups* are better off under Policy D than Policy C. Under Policy D, the poor get $100 million in net benefits versus only $50 million under Policy C, while the rich get $200 million versus $50 million.

The problem with Policy C is that the additional 50 lives saved from the poor over Policy D come at an incremental cost to the poor of $250 million, while the group is only willing to pay $200 million for those statistical lives. These costs may be direct effects (higher cost for water or energy) or indirect effects (higher rents or higher costs for consumer goods). In any case, imposing homogeneity in values does violence to each group's preferences. It requires the poor group to actually pay a cost they cannot afford: for them, more basic priorities (perhaps food and shelter) take precedence over the reduction in pollution, whereas the rich can afford the cost. Again, true environmental justice respects groups' own preferences rather than imposing them from the outside.[84]

The reason for the seeming dilemma is that in evaluating the relative merits of Policies A and B, we jumped too quickly to the conclusion that using heterogeneous VSLs favors Policy B. In fact, we only found that the *efficiency criterion alone* favored Policy B. What this actually shows is not the importance of imposing homogeneity in willingness-to-pay values, but the importance of considering the equity objective as well. Considering heterogeneous values, we see that Policy A, relative to Policy B results in a transfer of $600 million to the poor ($800 million to $200 million) at a cost of $800 million to the rich. Whether this distributional improvement is worth the loss in aggregate benefits is not necessarily obvious to everybody. But those who would argue that Policy A is preferable to B are essentially claiming that it is.

The only way to make the "right" choice in both comparisons (A over B and D over C) is to consider *both* heterogeneity in willingness to pay *and* distributional objectives in the analysis. This is a two-step process. First, when comparing benefits for a group to costs for the same group, that group's preferences should be respected. This is the only way to respect the group's preferences and its consumer sovereignty. The result of this step is group-by-group net benefits. Then, in the second step, group-level net benefits should be compared to one another or aggregated using some kind of social weight, or both. For example, using a social weight of 2:1 for the poor group relative to the rich would exactly undo the effect

84. Foster, *supra* note 8, at 802-07.

of the higher VSL for the rich. Net benefits would now be $700 million for Policy A and only $300 million for Policy B. Thus, we would now choose Policy A, which saves more lives, over Policy B. Policy D would continue to be chosen over Policy C.

A logically equivalent way to arrive at the same point would be to use the same VSL for all groups, but increase the weight on costs to the poor group. Although equivalent logically, this framing of the analysis may be more palatable politically. It can also be easily explained by the notion that costs to the poor are especially burdensome because of their more basic needs to be purchased. (In the language of economics, they have a higher marginal utility of income.)

E. Nonuse Values

The fourth and final issue to consider is the role of so-called nonuse or existence values in distributional benefits. These are values that households have simply for things being a certain way rather than for using them to produce some good or service.[85] For example, EPA's RIA for the regulation of cooling intake structures notes that households may hold significant existence values for the marine life that would be spared by the new rules.[86] (These values would be in addition to use values related to subsistence or recreational fishing.) It is entirely plausible that a stated preference study of such existence values would find that different demographic groups hold different values for those benefits.

If so, should the distribution of nonuse values also be incorporated into an analysis of distributional effects? One might argue in the affirmative, on the grounds that nonuse values are a part of overall welfare and benefits are benefits. On the other hand, if society's motivation in considering distributional considerations is to some extent paternalistic, perhaps nonuse values for particular groups should not be given extra weight. In any case, nonuse benefits are rarely quantified in most RIAs anyway. Extending the analysis of more tangible benefits (or "use values"), routinely quantified in benefit-cost analysis, to distributional considerations is a logical first step, before nonuse benefits are similarly extended.

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85. On the economic theory of nonuse values, see generally A. MYRICK FREEMAN III, THE MEASUREMENT OF ENVIRONMENTAL AND RESOURCE VALUES 137-61 (2d ed. 2003). For a defense of the role of nonuse values in federal environmental regulation, see David A. Dana, *Existence Value and Federal Preservation Regulation*, 28 HARV. ENVTL. L. REV. 343 (2004). For critiques of their role, see sources cited *supra* note 8.

86. UNITED STATES ENVTL. PROT. AGENCY, ECONOMIC AND BENEFITS ANALYSIS FOR THE FINAL SECTION 316(B) PHASE II EXISTING FACILITIES RULE (2004), *available at* http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/phase2/econbenefits_final.cfm.

V. INCORPORATING DISTRIBUTIONAL EFFECTS

Recognizing the importance of distributional effects is one thing; actually incorporating them into environmental RIAs is another. How is this to be done in practice? One approach is to incorporate the distributional objective into the efficiency objective by using distributional weights on net benefits, and then aggregating them up to total net benefits. That is, net benefits for poorer (or other disadvantaged) groups would receive a larger weight when aggregating up across groups.[87] For example, one common approach is to parameterize a utility function of the form

$$v(y) = \frac{a}{1-p} y^{1-p}$$

where y is income, ρ is a parameter, and a is an arbitrary scaling. Then the marginal utility of money *is* $ay^{-\rho}$. These marginal utilities of money would be the social weights for a household with income y.[88]

Just as standard benefit-cost analyses using willingness-to-pay weights to combine different benefit categories (morbidity, mortality, recreation, etc.) into a single aggregate benefit, and uses dollars to combine benefits and costs into a single net benefit, so too would this approach combine efficiency and distribution by using these social welfare weights. Thus, it has the same advantage of reducing all the policy tradeoffs to a single criterion. Accordingly, this approach is advocated by those who have the most ambitious and lofty vision for benefit-cost analysis.

On the other hand, this approach has two disadvantages. First, most utility functions result in very severe penalties on benefits to richer households. For example, if, say, $\rho = 2$ in the above utility function (a common rule of thumb), then a household with an income of $100,000 would be given a weight 1/100 of a household with an income of $10,000. That is, these weights imply we would trade $100 to the first household for $1 to the second, even if the other $99 is wasted.[89] But however inefficient the tax system, surely there are more efficient ways to transfer funds than that! Arnold Harberger has suggested that one alternative might be to cap the

87. For early advocates of this approach, see for example, Freeman, *Income Distribution*, *supra* note 35; Freeman, *Six Federal Reclamation Projects*, *supra* note 35; HAVEMAN, *supra* note 35; Weisbrod, *supra* note 35. For more recent proposals, see for example, Adler, *supra* note 8; Johansson-Stenman, *Distributional Weights*, *supra* note 36; Johansson-Stenman, *On the Value of Life*, *supra* note 36.

88. *See, e.g.*, Harberger, *supra* note 35; Johansson-Stenman, *Distributional Weights*, *supra* note 36; Johansson-Stenman, *On the Value of Life*, *supra* note 36.

89. Harberger, *supra* note 35, at S112.

weights based on the marginal cost of public funds.[90] For example, based on recent evidence from European countries, the social cost of $1 in tax revenue appears to be about $2.[91] According to this approach, the weight on net benefits for the poorest group could be no more than two times the weight for the richest group, on the grounds that money can be transferred through the tax system at that rate of efficiency.

The second disadvantage of using distributional weights is the flipside of its greatest advantage: its attempt to reduce all objectives into a single scalar value is too ambitious by half. In making this attempt, it arrogates too much power to the benefit-cost practitioner.[92] An alternative approach is simply to display the distributional effects alongside aggregate benefits. For example, tables such as those accompanying the above examples could be displayed. Then, based on this information the truly authorized decision-makers can make the judgment call about the relative merits of an action. In other words, the decision-makers could use their own judgments—effectively, their own distributional weights—to shape policy.

This second broad approach of simply documenting distributional effects can in turn proceed along two paths. One path is to document the change in an index that reflects the degree of equity.[93] For example, for changes in income, one might show the change in the Gini coefficient or an Atkinson index, two well-known summary measures of inequality.[94] Recently, this approach has been extended to indices of distribution in health.[95] For example, Jonathan Levy et al. compute both the total changes in lives and the change in an Atkinson index of mortality rates resulting from a number of policies to control particulate emissions from buses.[96] They then display the combinations of the two objectives in a figure, with benefits on one axis and the distributional index on the other and various policies plotted in the two dimensions.[97] After providing this information, this approach would stop here

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90. *Id.* at S115.

91. *See* Henrik Jacobsen Kleven & Claus Thustrup Kreiner, *The Marginal Cost of Public Funds: Hours of Work Versus Labor Force Participation*, 90 J. PUB. ECON. 1955 (2006).

92. *See generally* Banzhaf, *Objective or Multiobjective?, supra* note 35.

93. *See, e.g.*, Adler, *supra* note 8.

94. On both approaches, see Anthony B. Atkinson, *On the Measurement of Inequality*, 2 J. ECON. THEORY 244 (1970).

95. *See* Jonathan I. Levy, Andrew W. Wilson & Leonard M. Zwack, *Quantifying the Efficiency and Equity Implications of Power Plant Air Pollution Control Strategies in the United States,* 115 ENVTL. HEALTH PERSP. 743 (2007); Jonathan I. Levy et al., *Evaluating Efficiency-Equality Tradeoffs for Mobile Source Control Strategies in an Urban Area*, 29 RISK ANALYSIS 34 (2009) [hereinafter Levy et al., *Evaluating Efficiency-Equality Tradeoffs*].

96. Levy et al., *Evaluating Efficiency-Equality Tradeoffs*, *supra* note 95.

97. *Id.* at 42.

and allow policy makers to make the tradeoffs among these two objectives.

The second path to documenting distributional effects separately is simply to display the effects on different groups, whether monetized as net benefits or not, in a table. This is the approach taken by Shadbegian et al. in their work on the acid rain trading program[98] and illustrated with the simple example of Table 1 discussed previously. This approach is probably most appropriate for incorporating environmental justice considerations into RIAs for two reasons.

First, even choosing a summary statistic to capture the distribution of an effect, such as the Atkinson index, unnecessarily imposes a judgment about distributional tradeoffs. A policy analyst would have to impose assumptions about the importance of inequity, and not just as measured by the variance of the distribution but by higher moments as well.[99] Little empirical evidence being available to justify any assumptions, the analyst would imply a degree of false precision.

Second, identifying distributional effects only in a single summary statistic runs counter to the goal of providing information of interest to various demographic groups. In contrast, documenting the net benefits across groups would provide the most information to the public as well as to policy makers. In the short run, fully informing the public of distributional effects in this way would facilitate public comments on specific regulations; in the long run, it would empower citizens to shape the legislative agenda. In this respect, providing information on distributional effects is consistent with one of the leading goals of EO 12898 and EPA's interpretation of it: public participation.[100]

VI. Conclusions

Finding an appropriate way to incorporate environmental justice considerations into policy-making has been a procedural challenge since President Clinton issued Executive Order 12898 over 15 years ago. Moreover, environmental justice continues to be overshadowed by efficiency considerations as embodied in benefit-cost analysis.

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98. Shadbegian et al., *supra* note 52.

99. That is, unless one income distribution second-order stochastically dominates another, there may not be a clear-cut ranking between the two. Different indices will variously weight different portions of the income distribution, some emphasizing realizations near the median, others in the tails of the distribution. Another way to state this is that different inequality indices are consistent with different social welfare functions. *See generally* JAMES FOSTER & AMARTYA SEN, ON ECONOMIC INEQUALITY (2d ed. 1997).

100. *See supra* text accompanying notes 20-24 and references therein.

This article has argued that both types of analyses can be enhanced by bringing them closer together. In particular, the most fruitful way to think about incorporating environmental justice consideration into RIAs is to draw on the much older tradition of incorporating distributional effects into benefit-cost analysis. Environmental justice considerations are a specific form of such distributional effects, effects specifically working through environmental channels and on the poor, or minorities, or both.

There are many ways to incorporate distributional analyses into RIAs and specifically benefit-cost analyses, from using distributional weights to simply documenting them in a table as a side display. Side displays may be the most feasible scientifically, the most pragmatic politically, and the most informative for environmental justice communities and other stakeholders.

By providing such distributional information, EPA would further its environmental justice objectives, by providing the information that all groups, including the poor, minorities, and environmental justice communities, need to understand the impacts of a regulatory action. By incorporating such information into its RIAs, EPA would integrate environmental justice considerations into its development of regulations. Finally, by actually allowing the new information to inform the design and selection of regulations so as to better protect disadvantaged groups, adding distributional impacts to RIAs would improve the distributive justice associated with EPA's actions as well as the procedural justice. In this way, EPA could truly weave environmental justice considerations into the "fabric" of its regulatory actions as it has recently pledged to do.[101]

101. EPA ACTION DEVELOPMENT GUIDE, *supra* note 13.

Table 1A. Benefit-Cost Analyses for Policy A

Group	Costs	Lives Saved	Benefits without Hetero-geneity	Benefits with Hetero-geneity	Net Benefits without Hetero-geneity	Net Benefits with Hetero-geneity
Rich	$1.7B	100	$600M	$800M	-$1.1B	-$900M
Poor	0	200	$1.2B	$800M	$1.2B	$800M
Total	$1.7B	300	$1.8B	$1.6B	$100M	-$100M

Table 1B. Benefit-Cost Analyses for Policy B

Group	Costs	Lives Saved	Benefits without Hetero-geneity	Benefits with Hetero-geneity	Net Benefits without Hetero-geneity	Net Benefits with Hetero-geneity
Rich	$1.7B	200	$1.2B	$1.6B	-$500M	-$100M
Poor	0	50	$300M	$200M	$300M	$200M
Total	$1.7B	250	$1.5B	$1.8B	-$200M	$100M

Benefits without heterogeneity in willingness to pay are based on a VSL of $6M; benefits with heterogeneity are based on a VSL of $8M for the rich and $4M for the poor.

Table 1C. Benefit-Cost Analyses for Policy C

Group	Costs	Lives Saved	Benefits without Hetero-geneity	Benefits with Hetero-geneity	Net Benefits without Hetero-geneity	Net Benefits with Hetero-geneity
Rich	$350M	50	$300M	$400M	-$50M	$50M
Poor	$350M	100	$600M	$400M	$250M	$50M
Total	$700M	150	$900M	$800M	$200M	$100M

Table 1D. Benefit-Cost Analyses for Policy D

Group	Costs	Lives Saved	Benefits without Hetero-geneity	Benefits with Hetero-geneity	Net Benefits without Hetero-geneity	Net Benefits with Hetero-geneity
Rich	$600M	100	$600M	$800M	$0	$200M
Poor	$100M	50	$300M	$200M	$200M	$100M
Total	$700M	150	$900M	$1B	$200M	$300M

Benefits without heterogeneity in willingness to pay are based on a VSL of $6M; benefits with heterogeneity are based on a VSL of $8M for the rich and $4M for the poor.