

CAN COST-BENEFIT ANALYSIS OF ENVIRONMENTAL POLICY GO GLOBAL?

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ABSTRACT: The use of cost-benefit analysis of environmental policy is spreading from the United States, where it has the longest tradition, to other parts of the globe. Already firmly rooted in Europe and other advanced economies, cost-benefit analysis is becoming more prevalent in developing countries as a way to evaluate environmental regulation. The spread of cost-benefit analysis raises questions about whether it is an appropriate tool for evaluating policy in these contexts, and what, if any, reforms are needed.

This Article discusses the challenges posed for cost-benefit analysis as it spreads, and how it can evolve to meet those challenges. Cost-benefit analysis can be valuable, and its use is likely to continue to grow. Before it is likely to become widespread in many developing countries, however, several important reforms will have to be made. There are many practical challenges to its adoption, including political issues and problems of institutional capacity. In addition, certain features of cost-benefit analysis as currently practiced will need to be reformed in light of the particular issues confronted by developing countries.

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INTRODUCTION

Cost-benefit analysis of environmental policy is widespread within advanced industrial economies. For thirty years, major environmental rules have been subjected to cost-benefit analysis in the United States, and the European Union has taken increasing steps to rely on formal and quantitative regulatory impact analysis that weighs costs against benefits. While cost-benefit analysis remains controversial as a tool to shape environmental policy,¹ the technique is “here to stay”² and has become a central instrument for evaluating and justifying regulatory decisions in the developed world.

But cost-benefit analysis is no longer limited to these countries. Growing environmental and public health threats from industrialization have increased demand for stronger environmental policy around the globe, bringing the need for a systematic tool to compare costs to benefits. While cost-benefit analysis is not as prevalent outside of the primary advanced countries, use of cost-benefit analysis as an aid to environmental decisionmaking has expanded in recent years in countries throughout Latin America, Asia, and Africa.³

But there are important barriers that many countries are likely to face as they expand their use of cost-benefit analysis. There are many practical challenges that must be overcome, including political hurdles as well as the capacity problems associated with gathering and deploying the analytic resources needed to conduct assessments of complex environmental policy.⁴ In addition, cost-

¹ See, e.g., FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2005).

² RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH 11 (2008).

³ The growing prevalence of cost-benefit analysis may make it a candidate for inclusion among those principles of national administrative procedure that countries are expected to respect, akin to other “global administrative law” norms such as the duty to disclose information and give notice of rules to affected parties. Cf. SABINO CASSESE, GLOBAL ADMINISTRATIVE LAW: CASES, MATERIALS, ISSUES 1-108 (Sabino Cassese et al. eds., 2d. ed. 2008).

⁴ R.G. Bell & J. Wilson, *How Much Is Too Much? Thoughts About the Use of Risk Assessment for Countries in Transition and the Developing World*, in

benefit analysis was developed in the context of the most advanced industrial economies; it is possible that the methodology, as it has evolved, cannot be easily generalized without important reforms. Perhaps most importantly, distributional issues, which are not addressed by traditional cost-benefit analysis, may need to take a more central place given the focus on poverty alleviation of many governments in developing countries. Further changes to cost-benefit analysis, including attempts to incorporate insights from development economics, may also be warranted.

Ultimately, the answer to the question of “can cost-benefit analysis go global?” is yes. As governments take on more sophisticated regulatory tasks, the need to estimate the effects of their decisions and weigh the positive against the negative will only grow—some tool that looks similar to cost-benefit analysis as it is currently conducted in the United States and Europe will be needed to fill that vacuum. But for cost-benefit analysis to truly be global—rather than a foreign import ineffectively grafted onto political institutions worldwide—it will need to be sufficiently flexible to take account of the many different policy contexts in which governments operate around the world.

This Article proceeds in three parts. Part I provides brief background on cost-benefit analysis, discussing its adoption and uses in the developed world, its spread across the globe, some of the special advantages that cost-benefit analysis may have for developing countries, and some of the conceptual issues that have arisen in the development context. Part II discusses a range of challenges that many developing countries will face as they attempt to make cost-benefit analysis more pervasive in government decisionmaking. Part III discusses how those barriers might be overcome, and what the shape of global cost-benefit analysis may look like.

I. THE GLOBAL POTENTIAL OF COST-BENEFIT ANALYSIS

Cost-benefit analysis has become a widely practiced tool for improving government decisionmaking throughout the developed world, but it also holds special potential in the developing context

to add quality, transparency, and efficiency to environmental, public health, and safety regulation. While there are clear and important differences between regulating in developed and developing economies, many of the dissimilarities provide additional justification for cost-benefit analysis in developing countries.

A. *The United States and Europe*

Cost-benefit analysis of environmental policy has become standard practice in most developed countries. Fundamentally, cost-benefit analysis estimates the negative and positive consequences of policies and then compares them along a common metric to identify the net effects of regulation. According to the standard formulation of the cost-benefit criteria, the purpose of regulation is to maximize net benefits—i.e. to adopt regulation up to the point where marginal benefits equal marginal costs.⁵ Cost-benefit analysis can range from highly technical documents produced by experts to simple balancing tests that recognize the positive and negative effects of policy options and attempt to find the most beneficial approach.

Cost-benefit analysis is used as a supplement to formal decisionmaking procedures, such as legislative enactment or administrative rulemaking. Cost-benefit analysis provides substantive input into the process—it is not itself a procedural mechanism (such as voting or arbitration) for making decisions. Ultimate authority rests in the appropriate political institutions; cost-benefit analysis is used to provide information for the decisions made by those institutions. There are a wide range of substantive criteria and decisionmaking standards that could (and do) serve as alternatives to cost-benefit analysis, including political calculation, morality, ideological commitment, legal reasoning, and gut instinct. Cost-benefit analysis works in tandem with these alternative substantive standards to inform the choices of political authorities.

The United States has placed formal cost-benefit analysis at the core of its regulatory system. In 1981, President Ronald Reagan signed Executive Order 12,291, which directed all

⁵ For general background on the conduct of cost-benefit analysis, see E. J. MISHAN & EUSTON QUAH, *COST-BENEFIT ANALYSIS* (5th ed. 2007).

executive agencies to conduct cost-benefit analysis prior to adopting new regulations. President William Jefferson Clinton continued the practice of regulatory review and cost-benefit analysis of environmental and public health policy during his term. After taking office, he issued Executive Order 12,866, which updated the Reagan Executive Order in several important ways, but retained the fundamental architecture of central review using cost-benefit analysis. The federal government has operated under Executive Order 12,866 since that time, with small modifications by President George W. Bush near the end of his term,⁶ and, recently, by President Barack Obama.⁷ Unless prohibited by law,⁸ cost-benefit analysis is the standard practice for setting environmental, health, and safety policy in the United States.

The European Union has also found an important place for a version of cost-benefit analysis within its regulatory process.⁹ The clearest manifestation of the growth of cost-benefit analysis in the European Union is the Better Regulation initiative, which the European Commission has been in the process of implementing since 2002. The purpose of the initiative is to “stimulate entrepreneurship and innovation, allow[] businesses to compete more effectively and to exploit fully the potential of the internal market” with the ultimate goal of “contribut[ing] to growth and job creation while maintaining high standards of social,

⁶ Exec. Order No. 13,422, 72 Fed. Reg. 2,763–75 (Jan. 23, 2007); Exec. Order 13,258, 3 C.F.R. 204 (2003). Both Bush orders were rescinded at the beginning of the Obama Administration. Exec. Order No. 13,497, 3 C.F.R. 218 (2010) *reprinted in* 5 U.S.C. § 601 app. at 80 (Supp. III 2010).

⁷ Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011); *see* Michael A. Livermore, *A Brief Comment on Humanizing Cost-Benefit Analysis*, 2011 EURO. J. RISK REG. 13 (discussing Obama order and explaining that it largely “repeats, clarifies, or modestly expands language from President Clinton’s Executive Order 12,866”).

⁸ This exemption is quite limited. There are some important cases in which statutes have been interpreted to prohibit the use of cost-benefit analysis. *See, e.g.,* *Whitman v. Am. Trucking Ass’ns*, 531 U.S. 457, 471 (2001) (finding that EPA could not consider costs when setting national ambient air quality standards under the Clean Air Act). But for the most part, courts have protected agencies’ ability to use cost-benefit analysis to structure regulatory decision making. *See* *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498, 1510 (2009) (finding that EPA may undertake cost-benefit analysis when applying technology-based standards under the Clean Water Act).

⁹ Jonathan B. Wiener, *Better Regulation in Europe*, 59 CURRENT LEGAL PROBS. 447 (2006).

environmental, health and consumer protection.”¹⁰ A key component of the Better Regulation program is a requirement of regulatory impact analysis for all Commission “initiatives which are likely to have a significant impact.”¹¹ The purpose of the impact assessments is to “analyze both benefits and costs, and address in a balanced way all the significant economic, social and environmental impacts of [] possible initiatives.”¹² These impact assessments for Commission actions—including both legislative and regulatory proposals—are a clear move to place a version of cost-benefit analysis at the heart of regulatory decisionmaking at the European level.

There are several justifications for the use of cost-benefit analysis. Chief among these is that it helps to structure the exercise of agency discretion. In the United States, environmental, public health, and safety laws grant administrative agencies—which are under the control of the President—wide discretion for carrying out their statutory duties. Some of these statutes give agencies an extraordinary ambit for their authority, and relatively little guidance. For example, the Occupational Health and Safety Act of 1970 provides for workplace standards “reasonably necessary or appropriate to provide safe or healthful employment and places of employment.”¹³ This language gives the Secretary vast discretion to set a regulatory agenda and adopt—or refuse to adopt—a large field of potential rules. Even where Congress has given the agency more complete statutory instructions, there remains a large measure of agency discretion, especially on technical matters where courts are loath to overturn expert agency decisions.¹⁴ E.U. institutions, which exist at the supra-national level, and are only loosely checked by democratic institutions,¹⁵ also have broad

¹⁰ See COMM’N OF THE EUROPEAN COMMUNITIES, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS 2 (2009).

¹¹ *Id.* at 6.

¹² *Id.*

¹³ 29 U.S.C. § 652(8) (2006).

¹⁴ See *Whitman v. Am. Trucking Ass’ns*, 531 U.S. 457, 472–76 (2001).

¹⁵ The possibility of truly democratic Europe-level institutions is itself a subject of debate. See Mette Jolly, *A Demos for the European Union?*, 25 POL. 12 (2005) (discussing nature and importance of the concept of *demos* in context of European integration); J.H.H. Weiler, *Does Europe Need a Constitution? Demos, Telos and the German Maastricht Decision*, 1 EUR. L.J. 219 (1995) (arguing that lack of *demos* for European Union does not preclude Union-wide

discretion that needs to be cabined.

While the theoretical purpose of cost-benefit analysis is to cabin agency decisionmaking by structuring choices around a criteria of maximizing net benefits, the political context that has given rise to broader use of cost-benefit analysis is often more antiregulatory in nature. The growth of cost-benefit analysis in the United States in the 1970s and 1980s was justified in part “to combat inflation and recession.”¹⁶ The purpose of the European Better Regulation campaign similarly was to “remedy its sluggish economy.”¹⁷ So close is the connection that “[i]t almost goes without saying that one key purpose of regulatory reform is to reduce costs.”¹⁸

While cost-benefit analysis can be a neutral tool of policy analysis, during both the Reagan “regulatory relief” efforts in the United States, and the “Better Regulation” campaign in Europe, it took on a more antiregulatory character as it became a tool to reduce regulatory costs. This antiregulatory association has clung to cost-benefit analysis in the United States, where interest groups that advocate for greater government protections, such as environmental groups, have tended to oppose widespread use of cost-benefit analysis.¹⁹ However, with the embrace by the Obama Administration of cost-benefit analysis—coupled with that Administration’s aggressive regulatory moves in several areas—the link between cost-benefit analysis and an antiregulatory agenda may be weakening.²⁰

democratic institutions); *see generally* Dieter Grimm, *Does Europe Need a Constitution?*, 1 EUR. L.J. 282 (1995) (analyzing calls for European Union constitution); Jeremy Rabkin, *Is EU Policy Eroding the Sovereignty of Non-Member States?*, 1 CHI. J. INT’L L. 273 (2000) (arguing that the EU has a democratic deficit because its policies are biased in a social democratic direction).

¹⁶ Wiener, *supra* note 9, at 455.

¹⁷ *Id.*

¹⁸ *Id.* at 456.

¹⁹ *See, e.g.*, REVESZ & LIVERMORE, *supra* note 2, at 10.

²⁰ *See generally* Michael A. Livermore & Richard L. Revesz, *Retaking Rationality Two Years Later*, 48 HOUS. L. REV. 1 (2011). One particularly notable use of cost-benefit analysis to justify expanded regulatory action is in the context of climate change, where the Obama administration created an interagency task force to establish an administration-wide “social cost of carbon” to estimate the monetary value of greenhouse gas reductions. This figure has been used in a number of regulatory contexts, including fuel efficiency standards for automobiles, to justify relatively strict standards. *See generally*

B. *The Global Growth of Cost-Benefit Analysis*

While cost-benefit analysis has not been institutionalized throughout the world to the same extent that it has been in European nations and the United States, there are important precedents for the use of cost-benefit analysis outside these countries. These studies range from purely academic exercises to higher-impact analyses that are targeted at particular policy settings and have been carried out by government actors (sometimes in collaboration at the international level), scholars, and advocacy organizations. Some attempt full and comprehensive cost-benefit analyses, while others look at cost-effectiveness or generate quantitative benefits analysis in aid of decisionmaking, but all incorporate important aspects of cost-benefit analysis as a way of thinking about and evaluating environmental policy. Cost-benefit analysis has seen the greatest growth, and is likely to be most useful, in those countries with relatively strong regulatory institutions and higher levels of economic growth.²¹

In Mexico, the Instituto Nacional de Ecología (INE) located in the national office of the Secretary for the Environment and Natural Resources, has conducted several studies that look at the costs and benefits of environmental policies.²² Studies of the economic costs and benefits of reducing the sulfur content of diesel fuel and adopting a bus rapid transit project for Mexico City have found that environmental policies can generate significant economic benefits. The EPA's Integrated Environmental Strategies program has worked with the INE to increase its capacity to conduct sophisticated policy analysis.²³ Academic

INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, U.S. GOV'T, APPENDIX 15A, SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866; Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324 (May 7, 2010).

²¹ While some work has been done to examine the economic efficiency of policies in less developed countries, for cost-benefit analysis to be more than an academic exercise, there must be sufficiently robust institutions to implement desired policies and achieve some level of regulatory compliance.

²² See, e.g., INSTITUTO NACIONAL DE ECOLOGÍA, THE BENEFITS AND COSTS OF A BUS RAPID TRANSIT SYSTEM IN MEXICO CITY (2008) [hereinafter *Bus RTS*]; INSTITUTO NACIONAL DE ECOLOGÍA, ESTUDIO DE EVALUACIÓN SOCIO-ECONÓMICA DEL PROYECTO INTEGRAL DE CALIDAD DE COMBUSTIBLE (2006).

²³ See *Bus RTS*, *supra* note 22, at 4.

researchers in Mexico have also conducted policy assessments that incorporate cost-benefit analysis to identify efficient government options for energy policies.²⁴

Elsewhere in Latin America, there are many examples of important cost-benefit analyses being conducted. Some studies looked at costs and benefits from a micro-level—for example, a study sponsored by the World Bank and the International Bank for Reconstruction and Development in 1994 that examined the effects of soil conservation on small farmers.²⁵ Other studies have examined costs and benefits of larger-scale questions, such as the ancillary effects of climate change mitigation or the life-saving effects of measures to reduce air pollution in major metropolitan areas.²⁶ Deforestation has also been examined through an economic lens,²⁷ as well as road construction,²⁸ disease control,²⁹ and waterway projects.³⁰

Several cost-benefit analyses have been conducted in Africa, focusing on urban air pollution,³¹ forest management,³² and water

²⁴ See, e.g., J. Islas et al., *Cost-Benefit Analysis of Energy Scenarios for the Mexican Power Sector*, 28 ENERGY 979 (2003).

²⁵ Ernst Lutz et al., *The Costs and Benefits of Soil Conservation: The Farmers' Viewpoint*, 9 WORLD BANK RES. OBSERVER 273 (July 1994).

²⁶ See, e.g., Michelle L. Bell et al., *Ancillary Human Health Benefits of Improved Air Quality Resulting from Climate Change Mitigation*, 7 ENVTL. HEALTH 41 (2008); Michelle L. Bell et al., *The Avoidable Health Effects of Air Pollution in Three Latin American Cities: Santiago, Sao Paulo, and Mexico City*, 100 ENVTL. RES. 431 (2006); Luis A. Cifuentes & Lester B. Lave, *Economic Valuation of Air Pollution Abatement: Benefits from Health Effects*, 18 ANN. REV. OF ENERGY & ENV'T 319 (1993); Raúl O'Ryan & Manuel Díaz, *Risk-Cost Analysis for the Regulation of Airborne Toxic Substances in a Developing Context: The Case of Arsenic in Chile*, 15 ENVTL. & RESOURCE ECON. 115 (2000).

²⁷ Lykke E. Andersen, *A Cost-Benefit Analysis of Deforestation in the Brazilian Amazon* (Inst. for Applied Econ. Res., Working Paper 455, 1997).

²⁸ Lia Peñarrieta Venegas & Leonardo C. Fleck, *BENEFICIOS Y COSTOS DEL MEJORAMIENTO DE LA CARRETERA CHARAZANI-APOLO* (Conservation Strategy Fund, Serie Técnica No. 14, 2007).

²⁹ M.A. Basombrio et al., *A Cost-Benefit Analysis of Chagas Disease Control in North-Western Argentina*, 92 TRANSACTIONS ROYAL SOC'Y TROPICAL MED. & HYGIENE 137 (1998).

³⁰ Enrique H. Bucher & Paul C. Huszar, *Project Evaluation and Economic Development: On Using Benefit-Cost Analysis to Evaluate Hidrovia*, 19 ECOLOGICAL ECON. 201 (1996); Enrique H. Bucher & Paul C. Huszar, *Critical Environmental Costs of the Paraguay-Paraná Waterway Project in South America*, 15 ECOLOGICAL ECON. 3 (1995).

³¹ Anthony Leiman et al., *Reducing the Healthcare Costs of Urban Air*

treatment.³³ Studies have also been done of energy alternatives³⁴ and the economic costs and benefits of land redistribution policy.³⁵ In 2009, the World Bank sponsored an extensive analysis concerning the use of cost-benefit analysis in Africa, focusing on the challenges posed by valuation in that context.³⁶ There is also growing use of cost-benefit analysis in Asia. In China, studies have looked at costs and benefits of greenhouse gas reductions, including co-benefits³⁷ and the greenhouse gas benefits of energy policy.³⁸ Other studies have focused on the valuation of health benefits of potential indoor air quality policies³⁹, as well as broader air pollution strategies in Shanghai.⁴⁰ A major collaboration between the EPA and Chinese environmental officials resulted in a sophisticated analysis of the costs and benefits of air pollution controls targeted at reducing concentrations of nitrogen oxides and

Pollution: The South African Experience, 84 J. ENVTL. MGMT. 27 (2007).

³² Bianca Currie et al., *Cost-Benefit Analysis of Alien Vegetation Clearing for Water Yield and Tourism in a Mountain Catchment in the Western Cape of South Africa*, 68 ECOLOGICAL ECON. 2574 (2009); D.C. Le Maitre et al., *Invasive Alien Trees and Water Resources in South Africa: Case Studies of the Costs and Benefits of Management*, 160 FOREST ECOLOGY & MGMT. 143 (2002).

³³ F.W. Ntengwe, *The Cost Benefit and Efficiency of Waste Water Treatment Using Domestic Ponds—The Ultimate Solution in Southern Africa*, 30 PHYSICS & CHEMISTRY OF THE EARTH 735 (2005).

³⁴ W.T. Wiskerke et al., *Cost/Benefit Analysis of Biomass Energy Supply Options for Rural Smallholders in the Semi-Arid Eastern Part of Shinyanga Region in Tanzania*, 14 RENEWABLE & SUSTAINABLE ENERGY REVIEWS 148 (2010).

³⁵ Klaus Deininger et al., *Economic Benefits and Costs of Land Redistribution in Zimbabwe in the Early 1980s*, 32 WORLD DEV. 1697 (2004).

³⁶ WORLD BANK & AFR. REFINERS ASS'N, FINAL REPORT: SUB-SAHARAN AFRICA REFINERY PROJECT EXECUTIVE SUMMARY (2009), available at http://siteresources.worldbank.org/INTOGMC/Resources/ssa_refinery_study.pdf.

³⁷ Haakon Vennemo et al., *Benefits and Costs to China of Three Different Climate Treaties*, 31 RESOURCE & ENERGY ECON. 139 (2009); Jin Cao, *OPTIONS FOR MITIGATING GREENHOUSE GAS EMISSIONS IN GUIYANG, CHINA: A COST-ANCILLARY BENEFIT ANALYSIS* (Econ. & Env't Program for Southeast Asia, Research Report No. 2004-RR2) (2004).

³⁸ Dolf Gielen & Chen Changhong, *The CO2 Emission Reduction Benefits of Chinese Energy Policies and Environmental Policies: A Case Study for Shanghai, Period 1995–2020*, 39 ECOLOGICAL ECON. 257 (2001).

³⁹ C.K. Chau et al., *Valuing the Health Benefits of Improving Indoor Air Quality in Residences*, 394 SCI. TOTAL ENV'T 25 (2008); see also C.K. Chau et al., *Assessing the Benefit and Cost for a Voluntary Indoor Air Quality Certification Scheme in Hong Kong*, 320 SCI. TOTAL ENV'T 89 (2004).

⁴⁰ Jia Li et al., *Quantifying the Human Health Benefits of Curbing Air Pollution in Shanghai*, 70 J. ENVTL. MGMT. 49 (2004).

sulfur dioxide.⁴¹ Other studies have estimated costs and benefits of the use of fertilizer in agriculture,⁴² urban green spaces,⁴³ aquaculture systems,⁴⁴ afforestation,⁴⁵ and water management projects.⁴⁶

In India, cost-benefit analyses have been undertaken to analyze pollution control initiatives in the cement industry,⁴⁷ watershed development programs,⁴⁸ and the reuse of greywater in residential schools.⁴⁹ Other studies have analyzed the use of biogas in rural areas,⁵⁰ and the economic benefits from arsenic removal from ground water⁵¹ and decontamination of the Ganges river.⁵² Elsewhere in Asia, researchers have estimated the

⁴¹ US-CHINA JOINT ECON. RESEARCH GRP., US-CHINA JOINT ECONOMIC STUDY: ECONOMIC ANALYSES OF ENERGY SAVING AND POLLUTION ABATEMENT POLICIES FOR THE ELECTRIC POWER SECTORS OF CHINA AND THE UNITED STATES (2007).

⁴² Ping-an Xiang et al., *External Costs and Optimum Use of Nitrogen Fertilizer Based on the Balance of Economic and Ecological Benefits in the Paddy Field System of the Dongting Lake Area, China*, 6 AGRIC. SCI. P.R.C. 347 (2007).

⁴³ Wendy Y. Chen & C. Y. Jim, *Cost-Benefit Analysis of the Leisure Value of Urban Greening in the New Chinese City of Zhuhai*, 25 CITIES 298 (2008).

⁴⁴ Wei Zheng et al., *Benefit and Cost Analysis of Mariculture Based on Ecosystem Services*, 68 ECOLOGICAL ECON. 1626 (2009).

⁴⁵ Deying Xu, *The Potential for Reducing Atmospheric Carbon by Large-Scale Afforestation in China and Related Cost/Benefit Analysis*, 8 BIOMASS & BIOENERGY 337 (1995).

⁴⁶ Shabaz Mushtaq et al., *Examining Economies of Scale and Cost-Benefit of Small Multi-Purpose Storage Ponds in the Zhanghe Irrigation System, China*, 58 IRRIGATION & DRAINAGE 131 (2009).

⁴⁷ Inamul Haq et al., *Cost-Benefit Analysis of Control Measures in Cement Industry in India*, 23 ENV'T INT'L 33 (1997).

⁴⁸ K.N. Ninan & S. Lakshmikanthamma, *Social Cost-benefit Analysis of a Watershed Development Project in Karnataka, India*, 30 AMBIO 157 (2001).

⁴⁹ Sam Godfrey et al., *Greywater Reuse in Residential Schools in Madhya Pradesh, India—A Case Study of Cost-Benefit Analysis*, 53 RESOURCES, CONSERVATION & RECYCLING 287 (2009).

⁵⁰ Pallav Purohit & Tara Chandra Kandpal, *Techno-Economics of Biogas-Based Water Pumping in India: An Attempt to Internalize CO₂ Emissions Mitigation and Other Economic Benefits*, 11 RENEWABLE & SUSTAINABLE ENERGY REVIEWS 1208 (2007); see also Ramesh Bhatia, *Appraisal of Bio-Gas Units in India: Framework for Social Benefit Cost Analysis*, 12 ECON. & POL. WKLY. 1503 (1977).

⁵¹ Joyashree Roy, *Economic Benefits of Arsenic Removal from Ground Water – A Case Study from West Bengal, India*, 397 SCI. TOTAL ENV'T 1 (2008).

⁵² This paper included the estimation of “user and non-user benefits, health benefits to the poor households living along the river, and agricultural benefits to farmers among other benefits.” See A. Markandya & M.N. Murty, *Cost-Benefit*

economic cost of air pollution,⁵³ examined the net benefits of conservation of animal species,⁵⁴ and conducted cost-benefit analysis of energy efficiency standards.⁵⁵

One important development has been the use by non-governmental organizations of cost-benefit analysis to convince governments to take a more aggressive posture towards environmental protection. This stands in contrast to the approach of some environmental groups in the more developed countries, which have opposed the use of cost-benefit analysis in evaluating environmental policy.⁵⁶ Examples of advocacy groups using cost-benefit analysis to advance their agenda include studies by Conservation Strategy Fund (CSF), which have looked, among other issues, at the economic benefits of parks in the Amazon,⁵⁷ or the costs and benefits of different options for the improvement of roads in Bolivia.⁵⁸ CSF also partners with local NGOs to train them in the basics of environmental economics and cost-benefit analysis to improve the efficacy of their advocacy efforts.⁵⁹ Conservation International—a major international environmental organization—has also used cost-benefit analysis to promote its goals, for example by engaging in collaboration with the government of Liberia to “support . . . the government with scientific and economic advice to weigh the costs and benefits” of forest preservation policy.⁶⁰

Analysis of Cleaning the Ganges: Some Emerging Environment and Development Issues, 9 ENV'T & DEV. ECON. 61, 61 (2004).

⁵³ Euston Quah & Tay Liam Boon, *The Economic Cost of Particulate Air Pollution on Health in Singapore*, 14 J. ASIAN ECON. 73 (2003).

⁵⁴ Ranjith Bandara & Clem Tisdell, *The Net Benefit of Saving the Asian Elephant: A Policy and Contingent Valuation Study*, 48 ECOLOGICAL ECON. 93 (2004).

⁵⁵ T.M.I. Mahlia et al., *Cost-Benefit Analysis of Implementing Minimum Energy Efficiency Standards for Household Refrigerator-Freezers in Malaysia*, 32 ENERGY POL'Y 1819 (2004).

⁵⁶ See generally REVESZ & LIVERMORE, *supra* note 2, at 10.

⁵⁷ Marcos Amend et al., *Benefícios Econômicos Locais de Áreas Protegidas na Região de Manaus, Amazonas*, 2 MEGADIVERSIDADE 62 (2006).

⁵⁸ Venegas & Fleck, *supra* note 28.

⁵⁹ “The foundation of our work is teaching local conservationists how to use economics to succeed.” *About Conservation Strategy Fund*, CONSERVATION STRATEGY FUND, <http://conservation-strategy.org/en/about> (last visited Oct. 17, 2010).

⁶⁰ Molly Bergen, *The Wealth of Forests*, CONSERVATION INT'L., http://www.conservation.org/FMG/Articles/Pages/the_wealth_of_forests_liberia

While incorporation of cost-benefit analysis into decisionmaking is less common outside the most advanced economies, analyses and studies are being undertaken both by academics and government institutions to inform environmental decisionmaking. The growth of this research in recent years is likely to expand as environmental policy takes on more importance. Many of the same questions that have arisen in the United States and Europe are beginning to become more common throughout the world: How clean is clean enough? What costs are we willing to impose to achieve environmental protection? How can we regulate to achieve maximum results at the lowest costs? In answering these questions, countries are increasingly turning to cost-benefit analysis.

C. *Advantages of Cost-Benefit Analysis in the Development Context*

Cost-benefit analysis can help many countries formulate environmental policy for the same reason developed countries find it helpful—by providing a systematic mechanism to pull together information about a policy choice and compare alternatives. But, there are reasons why cost-benefit analysis can provide special advantages in the development context. First, and most obviously, developing countries have less money to waste, and therefore mechanisms to ensure that regulations are delivering benefits that justify their costs are especially important. The economic problems within the United States and Europe that provided the political impetus for adoption of cost-benefit analysis are small compared to the vastly larger economic difficulties faced by many developing countries. For these reasons, there is less social wealth to be spent generally, and on environmental, public health, and safety protections specifically. Given the more limited resources of developing countries, it is doubly important that regulations be able to achieve much with as little waste as possible.

By the same token, however, cost-benefit analysis can help justify regulatory expenditures even in cases where governments face tight budget constraints by showing where regulations have net social benefits—where benefits exceed costs. While some developed countries may be willing to adopt regulations that have

net costs, in order to achieve other social goals like fairness or to discharge widely felt moral responsibilities, developing countries are less able to afford net cost measures. But, where there are net benefits to regulation, then, absent some countervailing problem such as distributional concerns, regulation is the appropriate economic course, and even poor countries should move forward. In cases where benefits exceed costs, rich countries and poor countries are on equal footing—failing to regulate in those circumstances is the costly choice.

Second, cost-benefit analysis can help improve regulatory systems that lack transparency, or in which special interest politics have become too dominant. Just as there is persistent concern within developed countries that regulatory agencies have been delegated too much power, there are similar questions about the exercise of state authority in many developing countries. Rules on transparency of government action, public participation, access to media, judicial review, and reason-giving are sometimes new, non-existent, or poorly understood and enforced. Independent institutions that have power-checking functions in developed countries—such as independent media, scholarly institutions, professional associations, and other civil society actors—are often weak, more subject to state control, or simply lacking the necessary information to bring government actors to account. More to the point, democratic institutions can themselves be weak, voters can be ill-informed about the day-to-day goings-on in government, and there may be ineffective oppositional forces to challenge ruling parties. While these same kinds of problems can also affect developed countries, they are worse in many parts of the developing world.

Cost-benefit analysis improves transparency by making the decisionmaking process explicit, requiring decision makers to report their data, assumptions, and expectations, and subjecting analysis to outside scrutiny and criticism by experts.⁶¹ While the public may be poorly situated to evaluate cost-benefit analysis, scholars, political commentators, and civil society actors can review and criticize cost-benefit analysis in a way that is simply impossible when decisions are made behind closed doors. In this

⁶¹ Daniel H. Cole, *Regulatory Cost-Benefit Analysis and Collective Action* (Institute for Policy Integrity, Working Paper No. 2009/1).

way, cost-benefit analysis can improve the ability of outside institutions to subject government actions to scrutiny. While cost-benefit analysis clearly cannot solve all of a society's transparency problems, by forcing government actors to make their choices and the information that they are using to arrive at decisions more explicit, it can serve an extremely important transparency function.

A third important advantage of cost-benefit analysis is its ability to provide a neutral language with which to condemn unwise programs. The methodological limits of cost-benefit analysis create constraints on how far it can legitimately be "stretched" to justify wasteful programs that may be supported by political officials. At the same time, cost-benefit analysis casts criticism in a technocratic language that may be less threatening to powerful political actors. Cost-benefit analysis applies a neutral and universal standard, drawing attention to inefficient programs without resorting to inflammatory political or moral attacks.

For these reasons, among others, cost-benefit analysis can provide a useful supplement to decisionmaking procedures throughout the developing world. Just as it has helped developed countries cabin the discretion of executive decisionmakers by providing substantive criteria and formal procedures for good decisionmaking, cost-benefit analysis can substantially improve how decisions are made in developing countries as well. For countries that face special challenges—including the need to boost economic growth and grow stable and well-functioning political institutions—cost-benefit analysis can be an especially useful tool.

D. *Conceptual Valuation Issues*

Perhaps one of the most controversial questions raised by the expansion of cost-benefit analysis is the issue of the dimension upon which costs and benefits are measured. In current practice, the standard measures are monetary representations of "willingness to pay" or "willingness to accept."⁶² The compliance costs of regulation are weighed against how much individuals value the benefit that is produced by the regulation. Individual preferences, then, form the foundation for the practice of cost-benefit analysis and give the results of analysis normative

⁶² The EPA guidelines provide a discussion of this issue. U.S. ENVTL. PROT. AGENCY, EPA 240-R-00-003, GUIDELINES FOR PREPARING ECONOMIC ANALYSES 60–61 (2000).

weight.⁶³

Some economists, lawyers, and philosophers have argued that preference satisfaction is not the best measure of a policy. Perhaps most prominently, development economist Amartya Sen has argued in favor of a “capabilities” approach to development, where standard criteria of development—such as GDP per capita—are replaced with measures more finely tuned to identifying whether policies are providing people with the “ability to do valuable acts or reach valuable states of being.”⁶⁴ The term “capability,” which Sen developed, “represent[s] the alternative combinations of things a person is able to do or be—the various ‘functionings’ he or she can achieve.”⁶⁵

Philosopher Martha Nussbaum, a proponent of this approach, has identified ten general areas where capabilities are important: life; bodily health; bodily integrity; senses, imagination, and thought; emotions; practical reason; affiliation; other species; play; and control over one’s environment.⁶⁶ In the context of cost-

⁶³ The welfare economics criteria underlying typical cost-benefit analysis is Kaldor-Hicks efficiency, or the potential compensation test, which derives its normative appeal from the fact that the outcome could be achieved through theoretical market transactions: “[The compensation] principle . . . simply amounts to saying that there is no interpersonal comparison of satisfaction involved in judging any policy designed to increase the sum total of wealth just because any such policy *could* be carried out in a way as to secure unanimous consent.” Nicholas Kaldor, *Welfare Propositions of Economics and Interpersonal Comparisons of Utility*, 40 *ECON. J.* 549, 551 n.1 (1939) (emphasis in original). Criticism of this approach has existed for decades. See, e.g., I.M.D. LITTLE, *A CRITIQUE OF WELFARE ECONOMICS* 275 (Oxford Univ. Press 2002) (2d ed. 1957); John S. Chipman & James C. Moore, *The New Welfare Economics 1939–1974*, 19 *INT’L ECON. REV.* 547 (1978). But what it may lack in terms of bulletproof conceptual support, it makes up for by offering analysts a tractable problem and a tool to process information.

⁶⁴ Amartya Sen, *Capability and Well-Being*, in *THE QUALITY OF LIFE* 30 (Martha Nussbaum & Amartya Sen eds., 1993). For a short bibliography on the early development by Sen of the capabilities approach, see ACKERMAN, *supra* note 1.

⁶⁵ Sen distinguishes the capabilities approach from other approaches that: (1) focus on “personal utility” (most akin to traditional welfare economics); (2) focus on “opulence” (presumably related to GDP, a common development index); (3) are based purely on freedom (either negative freedom—i.e. libertarian—or positive freedom accounts); or (4) focus on “resource holdings as a basis of just equality” (distinguishing Dworkinian theories of distributive justice). *Id.*

⁶⁶ Martha C. Nussbaum, *Capabilities and Human Rights*, 66 *FORDHAM L. REV.* 273, 287–88 (1997).

benefit analysis, capabilities could be thought of as a theoretical replacement for preferences as the foundation for analysis—the net effects on these capabilities would be understood to be the important question, and maximizing net capabilities benefits would be the goal of regulation. Implementation of such an approach, however, would likely prove difficult.

In the health context, a commonly used tool for evaluation is the quality adjusted life years (QALY) approach. The benefits of public health policy or medical intervention are measured according to expected increase in life expectancy of the beneficiary, adjusted for a factor that takes into account the quality of the person's life. Under the QALY framework, the policies that maximize the number of QALYs per dollar spent are the most efficient choice.

Still others have argued that the appropriate goal of policy should be welfare maximization, rather than preference satisfaction.⁶⁷ For these commentators, the appropriate question to be asking is whether people are better off, all things considered, with the new regulation, and the goal of policy should be to make people as well off as possible. To the extent that individual preferences in fact track welfare, then these commentators endorse forms of cost-benefit analysis, although the normative foundations are different.⁶⁸

In many cases, differences among the capabilities approach, welfarist approach, QALY approach, and preferences approach are likely to largely be conceptual rather than practical. Where countries are only starting on the path of environmental regulation, any reasonable standard of valuation is likely to show significant net benefits for measures to reduce pollution and protect natural resources. In addition, the procedural benefits of cost-benefit analysis—transparency, taking into account all relevant factors, rigorous analysis of the effects of regulation—will exist regardless of choices between valuation criteria.

II. BARRIERS TO THE EXPANSION OF COST-BENEFIT ANALYSIS

There are many challenges that will have to be overcome if

⁶⁷ MATTHEW D. ADLER & ERIC A. POSNER, *NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS* 185–87 (2006).

⁶⁸ *Id.*

cost-benefit analysis is going to play a significantly larger role in structuring government decisions around the globe. The language of economics—associated by some with unpopular “Washington consensus” policies—lacks the positive legitimacy it enjoys in more advanced economies. Many developing countries are likely to have problems generating the needed capacity to carry out sophisticated cost-benefit analysis on a large scale. There is less experience monetizing the value of natural resource conservation, which may make up a larger share of regulatory benefits in some countries. For countries facing severe poverty, distributional issues are likely to require more attention than that given in traditional cost-benefit analysis. While none of these barriers are insurmountable, many of them likely currently play a role in limiting the spread of cost-benefit analysis. The ultimate diffusion of cost-benefit analysis, and its utility for decisionmakers, will depend in part on how well these barriers can be overcome.

A. *Positive Legitimacy*

In developed countries, cost-benefit analysis is a well-established technique that tends to add positive legitimacy to the decisions of policymakers. Regulatory review, with cost-benefit analysis at its core, has been practiced for three decades in the United States. For a number of reasons, cost-benefit analysis faces greater potential problems of positive legitimacy and acceptance in developing countries.

Part of the legitimacy of cost-benefit analysis derives from the fact that in developed countries, economics is accepted within academic and political circles as well as the general population as a legitimate tool of policy analysis. While the financial crisis of 2008–2009 has caused some very public soul-searching within the field of economics,⁶⁹ economic efficiency continues to be relied on as a major tool for analyzing public policy. The small fraction of groups that do not support the use of economics to assess policy sometimes ends up absenting itself from (rather than influencing) policy discussions.⁷⁰

⁶⁹ See, e.g., RICHARD A. POSNER, *A FAILURE OF CAPITALISM: THE CRISIS OF '08 AND THE DESCENT INTO DEPRESSION* (2009); Paul Krugman, *How Did Economists Get It So Wrong?*, N.Y. TIMES, Sept. 6, 2009, at MM36.

⁷⁰ See REVESZ & LIVERMORE, *supra* note 2, at 10, 155 (citing Interview with Sally Katzen, former Dep. Dir. for Mgmt., Office of Mgmt. and Budget, in

Western style economics—which forms the basis of cost-benefit analysis—does not necessarily enjoy the same level of positive legitimacy in certain developing countries. While there is nothing inherent in cost-benefit analysis that endorses a free-market style approach to regulation, it may be closely linked, at least at a psychological level, with “Washington Consensus”-type policies that have been widely condemned in the developing world.⁷¹ To the extent that cost-benefit analysis is weighed down by association with unpopular policies or approaches, it will enjoy less legitimacy.

In addition, developed countries began widespread adoption of cost-benefit analysis after they had put in place significant regulatory systems to address environmental, public health, and safety risk. The initial regulatory agenda was set on the basis of risk perceptions by the public, which provided the political environment needed to create new regulatory regimes. Cost-benefit analysis came later.

The political dynamic is different in developing countries. The economic problems that provided the political basis for adoption of cost-benefit analysis—including inflation and persistent unemployment—are often present in exacerbated form in developing countries, and they are accompanied by a host of other economic challenges as well. However, developing countries, facing vastly greater economic constraints, have never been in the position to undertake high levels of spending on environmental protection in the first place. If cost-benefit analysis is structured and perceived as a check on regulation, it may be politically unpopular if it is seen as undercutting overdue regulatory programs.

A particular issue that could erode popular support for cost-benefit analysis in developing countries is the problem of external

Wash. D.C. (Feb. 20, 2007)).

⁷¹ In particular, there has been widespread public anger over neoliberal policies promoted by international institutions, especially contractionary policies promoted through International Monetary Fund structural adjustments. Of course, “the term [‘Washington Consensus’] has been used to mean very different things by different people,” not all of them bad. John Williamson, *A Short History of the Washington Consensus* (2004) (unpublished paper commissioned by Fundación CIDOB for the conference From the Washington Consensus Towards a New Global Governance, Barcelona, September 24–25, 2004), <http://www.piie.com/publications/papers/williamson0904-2.pdf>.

inequality. Because risk-preferences tend to track fairly closely with wealth, it can be expected that rich countries will be willing to pay more to reduce environmental, public health, and safety risk than countries in earlier stages of development. Cost-benefit analysis would take these preferences into account, and ultimately would justify less strict public health protections in developing countries.

From a purely economic standpoint, regional differences in risk-preferences are neither surprising nor troubling.⁷² Correlations between wealth and willingness to pay to avoid risks are quite well established.⁷³ In fact, differences in preferences generally provide justification for the diffused systems of government that we see both internationally and within nations, including the federalist division of power in the United States⁷⁴ or subsidiarity in Europe.⁷⁵

At the same time, differing preferences for risk, especially

⁷² Olivier Armantier & Nicolas Treich, *Social Willingness to Pay, Mortality Risks and Contingent Valuation* 1 (2003) (unpublished manuscript, State University of New York at Stony Brook) (“[S]imply averaging individuals’ [willingness to pay] is inconsistent with the maximization of an utilitarian social welfare function, except in the special case where individuals all have the same marginal utility of money. This case, however, is unrealistic and difficult to justify empirically.”), <http://www.stonybrook.edu/economics/research/papers/2003/03-03.pdf>.

⁷³ See, e.g., DAVID WILLIAM PEARCE, GILES ATKINSON & SUSANA MOURATO, COST-BENEFIT ANALYSIS AND THE ENVIRONMENT: RECENT DEVELOPMENTS 198–99 (2006); Soma Bhattacharya, Anna Alberini & Maureen L. Cropper, *The Value of Mortality Risk Reductions in Delhi, India*, 34 J. RISK & UNCERTAINTY 21, 34, 37 (2007) (finding that willingness to pay varies with income); James K. Hammitt & Ying Zhou, *The Economic Value of Air-Pollution-Related Health Risks in China: A Contingent Valuation Study*, 33 ENVTL. & RESOURCE ECON. 399, 406, 414–15 (2006).

⁷⁴ See James M. Buchanan, *Federalism as an Ideal Political Order and an Objective for Constitutional Reform*, 25 PUBLIUS: J. OF FEDERALISM 19, 22 (1995). For a theoretical discussion, see generally Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416 (1956) (articulating a theoretical basis for local government competition and sorting).

⁷⁵ Consolidated Version of the Treaty on the Functioning of the European Union art. 69, Sept. 5, 2008, 2008 O.J. (C 115) 74 [hereinafter TFEU]; Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Communities art 3, Protocol on the Application of the Principles of Subsidiarity and Proportionality, Dec. 13, 2007, 2007 O.J. (C 306) 149–52 [hereinafter Treaty of Lisbon]; see generally Wouter P. J. Wils, *Subsidiarity and EC Environmental Policy: Taking People’s Concern Seriously*, 6 J. ENVTL. L. 85 (1994) (arguing for a broadening of the principle of subsidiarity).

when those preferences are closely associated with levels of development, highlight inequalities between countries. One consequence of differing preferences for risk is that lower levels of environmental protection will be justified in developing countries because they are willing to spend less to reduce mortality risks than developed countries. The trade-off between economic growth and environmental protection is simply different in countries that have different levels of economic development. To some, this result seems unfair because it disadvantages populations in developing countries through higher degrees of environmental risk.⁷⁶ If, as some have argued,⁷⁷ some degree of environmental protection is a human right, then no country can fall below that baseline standard, regardless of risk-preferences or level of economic development.

Another politically fraught consequence of differences in risk-preferences is that, from a purely economic standpoint, risk transfer from developed countries to developing countries can be justified.⁷⁸ This reality was discussed in the famous “Summers Memo” signed by Lawrence Summers when he was Chief Economist at the World Bank. This 1991 memorandum stated, *inter alia*, that “the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that.”⁷⁹

The reaction to the Summers memo was swift and global. As just one example, shortly after the memo was released publicly,

⁷⁶ The flip side of this argument is seen in developed countries, where some complain that lower environmental standards in the developing world amount to an unfair advantage for workers in those countries, causing a “race to the bottom” that undercuts environmental progress. Whether such a “race to the bottom” exists, or could be considered inefficient from an economic perspective, are other questions. See generally Richard Revesz, *Rehabilitating Interstate Competition: Rethinking the “Race to the Bottom” Rationale for Federal Environmental Regulation*, 67 N.Y.U. L. REV. 1210, 1233–47 (1992).

⁷⁷ See Kenneth F. McCallion & H. Rajan Sharma, *Environmental Justice Without Borders: The Need for an International Court of the Environment to Protect Fundamental Environmental Rights*, 32 GEO. WASH. J. INT’L L. & ECON. 351, 354–58 (2000); Alan Boyle, *Human Rights or Environmental Rights? A Reassessment*, 18 FORDHAM ENVTL. L. REV. 471, 507–11 (2007).

⁷⁸ Jay Johnson et al., *Potential Gains from Trade in Dirty Industries: Revisiting Lawrence Summers’ Memo*, 27 CATO J. 397 (2007).

⁷⁹ See Jim Vallette, *Larry Summers’ War Against the Earth*, COUNTER PUNCH, <http://www.globalpolicy.org/component/content/article/212/45462.html> (last visited Sep. 28, 2009).

Brazil's then-Secretary of the Environment Jose Lutzenburger wrote to Summers: "Your reasoning is perfectly logical but totally insane Your thoughts [provide] a concrete example of the unbelievable alienation, reductionist thinking, social ruthlessness and the arrogant ignorance of many conventional 'economists' concerning the nature of the world we live in."⁸⁰

The reaction to Summers' suggestion indicates exactly the kinds of political perils faced by those that wish to expand the use of cost-benefit analysis.⁸¹ Economic analysis can sometimes cast public policy choices in a stark and unforgiving light, clarifying tradeoffs between highly value-laden goods such as environmental protection and public health. Cost-benefit analysis is likely to highlight the realities of global inequalities of distribution, as protections that are justified in some countries will not be justified in others.

B. Capacity Challenges

Even where there is broad support for cost-benefit analysis, finding the resources to implement it on a widespread basis will pose a challenge. The analytic requirements are large, and developing countries have fewer resources to work with and the economic effects of policy are smaller, justifying less expenditure on analysis.

Developed countries have devoted significant resources to conducting cost-benefit analysis. In the United States, administrative agencies have hired significant personnel with expertise in economics, risk-analysis, and related disciplines for the purpose of analyzing policy alternatives. Many agencies have policy offices that are directly charged with developing regulatory agendas. The U.S. Environmental Protection Agency (EPA) in particular has devoted time, money, and staff to conducting cost-benefit analysis. Among other steps, EPA has created the National Center for Environmental Economics (NCEE), which employs

⁸⁰ The quote from Jose Lutzenburger is widely cited on websites opposed to the work of the World Bank. *See also* DERRICK JENSEN, *THE CULTURE OF MAKE BELIEVE* 124 (2004).

⁸¹ Indeed, the connection has been made explicit. *See* John R. Milanese, *Lawrence Summers' Memo, or Why Cost-Benefit Analysis is not a Moral Compass for Environmental Policy Analysts* (2004) (unpublished B.A. honors thesis) (on file with the New York University Environmental Law Journal).

dozens of economists and other professionals in order to “conduct[] and supervise[] research and development on economic analytic methods;” “lead[] production of EPA economic reports;” “provide guidance for performing economic analysis;” and prepare its own economic analyses of environmental policy.⁸² In addition to the NCEE, the EPA has created a standing committee of its Science Advisory Board—the Environmental Economics Advisory Committee (EEAC)—composed of economists and other experts from academia, that provides EPA with guidance on the economic analysis of environmental policy. The EPA has developed its own extensive guidelines for conducting economic analysis of proposed environmental regulations.⁸³ In addition to the capacity within administrative agencies at the federal level, there is also a centralized body, the Office of Information and Regulatory Affairs (OIRA) within the Office of Management and Budget (OMB), that has its own complement of several dozen professional staff that have developed significant expertise in the practice of cost-benefit analysis and regulatory review.

Beyond direct government spending, there is also a complement of academics and independent organizations that provide a great deal of data and analysis that augments government efforts.⁸⁴ The fields of risk analysis, cost-benefit analysis, and environmental and public health economics are well developed in advanced economies, with faculty at top institutions of higher education devoted to teaching new professionals and enhancing and expanding the field through scholarship. Significant extant literatures, on topics as diverse as risk-exposure and technological responses to regulations, help support government cost-benefit analysis.

In the developed world, it has made sense to devote resources

⁸² *About NCEE*, National Center for Environmental Economics, U.S. ENVTL. PROT. AGENCY, <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/AboutNCEE.html> (last visited May 20, 2009).

⁸³ U.S. ENVTL. PROT. AGENCY, *supra* note 62.

⁸⁴ As just one example, Professor Kip Viscusi has played a foundational role in conducting empirical analyses that support government cost-benefit analysis. *See, e.g.*, W. Kip Viscusi, *Labor Market Valuations of Life and Limb: Empirical Evidence and Policy Implications*, 26 PUB. POL’Y 359 (1978). Other researchers have discussed the institutional context of cost-benefit analysis and how it can improve decisionmaking. *See, e.g.*, RICHARD D. MORGENSTERN, *ECONOMIC ANALYSES AT EPA: ASSESSING REGULATORY IMPACT* (1997).

to regulatory analysis. Even where regulations have relatively small impacts as a percentage of the economy, the overall size of their economies means that they have large impacts in absolute terms. The threshold for subjecting national regulations to full cost-benefit analysis in the United States is \$100 million (USD) annual impact—regulations that have less of an impact are subjected to less analysis.⁸⁵ Similarly, the European Union guidelines limit full impact analysis to “significant” policies and recommend proportionally less analysis for those policies with less impact.⁸⁶ Even within developed countries, however, smaller governmental units sometimes have difficulty mustering the analytic resources to carry out cost-benefit analysis,⁸⁷ in part because the economic stakes are lower.

For small countries with relatively small economies, subjecting regulation to expensive cost-benefit analysis will not generally be efficient. Formal cost-benefit analysis requires significant resources—the decision to use cost-benefit analysis or not is itself subject to cost-benefit criteria. For many types of decisions, the benefits (in terms of more efficient policies) may not be worth the budgetary expenditures to conduct the analysis. If there will be relatively few policy moves that have sufficient economic impact to justify lengthy and resource intensive cost-benefit analysis, the start-up costs necessary to develop sufficient capacity to conduct this type of analysis may often be prohibitive.

Countries at lower levels of development may also not have a sufficiently large professional class to justify switching large numbers of highly educated experts to cost-benefit analysis. Given the many pressing demands faced by developing countries, it is not clear that highly educated community members can be optimally used in conducting regulatory analysis instead of serving in other high-value roles that need to be filled. While foreign experts can be hired, resource constraints will limit the ability of governments

⁸⁵ The threshold has remained unchanged since the original Executive Order. Compare Exec. Order No. 12,866, 58 Fed. Reg. 51,735 (Sept. 30, 1993), with Exec. Order No. 12,291, 46 Fed. Reg. 13,193 (Feb. 17, 1981).

⁸⁶ See EUROPEAN COMMISSION, IMPACT ASSESSMENT GUIDELINES 6 (2009).

⁸⁷ See generally Jason Schwartz, *52 Experiments with Regulatory Review: The Political and Economic Inputs into State Rulemaking* (Institute for Policy Integrity Report No. 6, 2010); see also Robert Hahn, *State and Federal Regulatory Reform: A Comparative Analysis 4* (AEI-Brookings Joint Ctr., Working Paper No. 98-03, 1998).

to carry out analyses.

Outside of government, civil society may lack the capacity to provide effective oversight of cost-benefit analysis. Even if government has sufficient analytic resources (or funding to hire those resources), a vital component to a healthy practice of cost-benefit analysis is the ability of outsiders to understand and criticize the assumptions, choices, and methodologies used in the analyses. To the extent that civil society lacks the capacity to hold government analysts accountable for their choices, cost-benefit analysis will be conducted in the absence of effective independent review, compromising its legitimacy and leading to potential errors or the risk of political manipulation.

The problem of data is also particularly acute for many developing countries. To conduct adequate cost-benefit analysis, information is needed on, *inter alia*, compliance costs, ambient environmental quality, population concentrations, and enforcement reliability. Developed countries can rely on a large stock of available information on many of these questions, while many developing countries will have to build this data from scratch. Additionally, the public and private institutions of data gathering and aggregation may be weak or non-existent. Without the necessary data, countries will be unable to formalize cost-benefit analysis, and will have to rely heavily on assumptions and estimates, undercutting the reliability of the analysis.

C. *Natural Resources*

Another set of problems that are likely to be exacerbated in developing countries revolves around the particular difficulties of deriving complete economic estimates of the value of protecting natural resources. Given their relative wealth of natural resources—especially living resources such as forest land—many of the most important environmental measures in developing countries may be targeted at preserving and managing these resources. Cost-benefit analysis, however, has traditionally been best applied to public health-oriented environmental regulations, where parameters to value regulatory benefits can be set through risk-preferences. While techniques do exist for setting values for non-health-related environmental protection policies, these techniques are widely understood to be less accurate and less complete than those used to measure the benefits of environmental

health regulations. Until valuation techniques for natural resource protection improves, cost-benefit analysis will be of only limited value in this important policy area. Environmental policies have a range of goals, including protecting public health from harmful pollutants, preserving wilderness areas and national heritage, protecting biodiversity, protecting economic opportunities, discharging ethical obligations to other species, maintaining ecosystems services, increasing recreational and tourism opportunities, and providing moral and spiritual benefits. Some of these goals are significantly more amenable to economic valuation than others. Where the benefits of policy are difficult to measure or monetize, cost-benefit analysis must necessarily provide less complete answers.

Public health oriented environmental regulation has traditionally been the easiest to value. There is a very large literature employing a wide range of techniques to estimate the public health impacts of environmental quality,⁸⁸ which, coupled with sophisticated modeling techniques,⁸⁹ can be used to provide extremely well-informed predictions of the public health effects of particular regulations. Once the public health impacts of the regulation are established, there are well-known tools for determining the economic value of these regulations, based on the willingness-to-pay for risk reduction.⁹⁰

Some techniques exist for valuing other types of environmental benefits. The concept of “ecosystems services” has been used to describe the wide range of positive benefits that are generated by healthy and well-functioning ecosystems. The Millennium Ecosystem Assessment has defined ecosystem

⁸⁸ For example, there is a vast literature used to evaluate the effects of air pollution on a range of health endpoints. The United States EPA, in its reevaluation of national ambient air quality standards for ozone, reviewed thousands of studies on the health impacts of ozone. *See* U. S. ENVTL. PROT. AGENCY, AIR QUALITY CRITERIA FOR OZONE AND RELATED PHOTOCHEMICAL OXIDANTS (2006); U. S. ENVTL. PROT. AGENCY, REVIEW OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE: POLICY ASSESSMENT OF SCIENTIFIC AND TECHNICAL INFORMATION, OAQPS STAFF PAPER (2007). Sophisticated modeling techniques are employed by EPA to estimate how particular regulations will impact public health.

⁸⁹ *See* Appendix W to Part 51—Guidelines on Air Quality Models, 70 Fed. Reg. 68,229 (Nov. 9, 2005) for an extended discussion of some of the models used in the United States to evaluate air quality policy.

⁹⁰ *See generally* U.S. ENVTL. PROT. AGENCY, *supra* note 62.

services to include “*provisioning services* such as food, water, timber, and fiber; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling.”⁹¹

In general, the category of ecosystem services that involve the use of a natural resource—as opposed to non-use values—are easier to value. The recreational value of natural parks has been estimated by tracking the amount of time and money that people are willing to spend to visit those areas.⁹² The value of fisheries or lands for timber harvest can be estimated through the aggregate commercial rents that are generated by the resource.⁹³ Dollars generated by the tourism industry can be used to provide valuations for certain environmental benefits. Water filtration services can be valued by the capital costs necessary for built infrastructure to replace them.⁹⁴ The value of pollination services can be based on the agricultural industry they support.⁹⁵

Other types of services, such as supporting cultural or religious values, are much harder to monetize. Where indigenous cultures have specific knowledge that can be used for broader social benefit, and ecosystems support maintenance of that

⁹¹ MILLENNIUM ECOSYSTEM ASSESSMENT (MEA), ECOSYSTEMS AND HUMAN WELL-BEING: SYNTHESIS at v (2005); see also James Salzman, Barton H. Thompson, Jr. & Gretchen C. Daily, *Protecting Ecosystem Services: Science, Economics, and Law*, 20 STAN. ENVTL. L.J. 309, 310 (2001) (free services provided by ecosystems include “purifying air and water, detoxifying and decomposing waste, renewing soil fertility, regulating climate, mitigating droughts and floods, controlling pests, and pollinating plants”).

⁹² See, e.g., Serkan Gürlük & Erkan Rehbera, *A Travel Cost Study to Estimate Recreational Value for a Bird Refuge at Lake Manyas, Turkey*, 88 J. ENVTL. MGMT. 1350 (2008).

⁹³ For example, the average annual value of harvests from commercial salmon fisheries in Alaska exceeded \$260 million during the years 1998–2002. DOUG WOODBY ET AL., ALASKA DEP’T OF FISH AND GAME, 05-09, COMMERCIAL FISHERIES OF ALASKA 4 tbl.1 (2005).

⁹⁴ For example, New York City has been engaged in a long-standing effort to protect the water filtration services provided by the Catskill and Delaware watersheds, in part because if those services fail, the city will be required to install an extremely expensive water filtration infrastructure. U.S. ENVTL. PROT. AGENCY, NEW YORK CITY FILTRATION AVOIDANCE DETERMINATION (2007), available at <http://www.nycwatershed.org/pdfs/Final%20FAD%202007.pdf>.

⁹⁵ Taylor H. Ricketts et al., *Economic Value of Tropical Forest to Coffee Production*, 101 PROC. NAT’L ACAD. SCI. 12,579, 12,581 (2004).

knowledge, the value of that benefit could conceivably be monetized.⁹⁶ Traditional monetization tools could be applied to certain types of other cultural ecosystems services; for example, by examining willingness-to-pay to preserve a specific landmark for use in religious ceremonies.

However, not all of the cultural services provided by ecosystems will be generated through use value. The concept of existence value is sometimes used to capture “non-use” value. Because existence value is expressly non-market, however, there are significant measurement problems.⁹⁷ Existence value has also been the subject of persistent conceptual criticism.⁹⁸

The sheer scope and complexity of ecosystems services also makes capturing their complete value extremely challenging. In addition to complex internal dynamics,⁹⁹ different ecosystems may be involved in supporting the same economic activities (for example, forest ecosystems that provide pollination and frozen tundra that provides climate stability, both supporting agriculture), and the same ecosystem can provide a wide range of services (for example, wetlands that provide carbon sequestration, water filtration, pest and disease regulation, pollination services, spiritual and religious value, wild foods, and recreational opportunity). Capturing the whole range of services provided by ecosystems can be extremely difficult.

Even countries with highly advanced systems of environmental regulation and strong familiarity with cost-benefit analysis, like the United States, have difficulty capturing the full range of value associated with protecting natural resources. The challenges facing developing countries—who have fewer analytic resources and larger reserves of natural resources—are even greater.

⁹⁶ See, e.g., Erika M. Zimmerman, *Valuing Traditional Ecological Knowledge: Incorporating the Experience of Indigenous People into Global Climate Change Policies*, 13 N.Y.U. ENVTL. L.J. 803, 825–36 (2005).

⁹⁷ KENNETH ARROW ET AL., REPORT OF THE NOAA PANEL ON CONTINGENT VALUATION (1993) <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.129.2114&rep=rep1&type=pdf> (discussing potential problems with but ultimately endorsing use of existence value).

⁹⁸ See generally Jonathan Aldred, *Existence Value, Welfare, and Altruism*, 3 ENVTL. VALUES 381 (1994).

⁹⁹ See generally BERNARD C. PATTEN & SVEN ERIK JØRGENSEN, *COMPLEX ECOLOGY: THE PART-WHOLE RELATIONS IN ECOSYSTEMS* (1995).

D. *Distribution*

Distributional concerns pose another set of difficult issues for developing countries. The first distributional concern presented by cost-benefit analysis is that willingness-to-pay is closely correlated with wealth. A person with a higher income can be expected to be willing to pay more for a reduction of the same risk than a person with a lower income. If cost-benefit analysis were to individualize willingness to pay, or separate classes of regulatory beneficiaries by income, it would have the effect of giving higher levels of protection to wealthy people than poor people, because they are willing to pay more for protection. For many, this outcome could conflict with fundamental concepts of fairness and equality before the law.

As conducted, however, cost-benefit analysis uses average valuations, not individual valuations, of policy costs and benefits.¹⁰⁰ Thus, the value of risk reduction is set for the entire U.S. population—there are no separate values for higher or lower income people. This situation comes about for both simple technical reasons—it would be more complex to try to divide the population into sub-groups, assign differing values for risks to those groups, and then classify all regulatory impacts according to those sub-groups—as well as the obvious political difficulty that would arise if groups within the country were treated differently. This practical solution undermines the distributional critique, and in fact, so long as burdens are distributed evenly throughout the population (or clump upwards), results in a downward (progressive) redistributive trend.¹⁰¹

A second order criticism is that, even where average values are used, cost-benefit analysis is insensitive to the distribution of regulatory costs and benefits. In its most basic form, cost-benefit analysis is only interested in maximizing net benefits in the

¹⁰⁰ Potential problems associated with use of a single nationwide value are discussed *infra* in Part III.B.

¹⁰¹ The redistribution occurs if wealth has less of an effect on willingness-to-pay than on the likelihood of bearing regulatory costs. There is some empirical disagreement about how quickly willingness-to-pay increases with wealth. See PEARCE, ATKINSON & MOURATO, *supra* note 73. It can also be unclear whether the costs of environmental policies fall more heavily on the poor in any given context. See Don Fullerton & Dan Karney, *Does Environmental Protection Hurt Low-Income Families?*, 21 INST. GOV'T & PUB. AFF. POL'Y F. no. 2 (2009) (discussing “pathways” that environmental policy can have regressive effects).

aggregate; it is not concerned with how those regulatory benefits are distributed. Thus, a program that increases the wealth of the rich (e.g. by preserving resources they value highly) while creating burdens on the poor (e.g. by reducing employment opportunities) could be justified by cost-benefit analysis so long as the value of the regulatory benefits was greater than the value of the regulatory costs.

One potential response to this argument is the claim that the role of cost-benefit analysis is to maximize wealth, which policymakers can choose to redistribute throughout the population as they choose. Under this line of thinking, distributional issues are beside the point for cost-benefit analysis, which should be focused exclusively on efficiency criteria rather than the subjective and political task of distributing social resources. This argument is bolstered by economic theory that suggests that changing regulation is an inefficient means of achieving distributional outcomes.¹⁰²

A more common response in the policymaking community is to recognize the importance of distributional effects. Some steps have been taken to integrate distributional analysis into regulatory assessment in the United States. The executive orders governing regulatory review in the United States explicitly call for distributional analysis,¹⁰³ and EPA's guidelines provide for methods to assess the distributional impacts of regulatory proposals.¹⁰⁴

These distributional issues, while they are important in developed economies, can be much more important for developing countries. Inequality and poverty are often a larger problem in developing countries,¹⁰⁵ a situation that some commentators argue

¹⁰² Louis Kaplow & Steven M. Shavell, *Why the Legal System is Less Efficient than the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667 (1994).

¹⁰³ Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 18, 2011); Exec. Order No. 12,866, 58 Fed. Reg. 51,735, 51,736 (Sept. 30, 1993).

¹⁰⁴ U.S. ENVTL. PROT. AGENCY, *supra* note 62, at 145–47.

¹⁰⁵ Measures of inequality themselves may be similar in some developed and developing countries. See *The World Factbook, Country Comparison: Distribution of Family Income - Gini Index*, CENT. INTELLIGENCE AGENCY, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2172rank.html>. Nevertheless, in prosperous countries with high inequality, such as the United States, even the poorest members of society have access to vastly greater resources than many individuals living in developing countries (even

has been exacerbated by the expansion of globalization¹⁰⁶—international trade, rapidly expanding telecommunications technology, and foreign investment all create economic opportunity, but may also tend to concentrate wealth in fewer hands.¹⁰⁷

Income inequality is especially troubling, from a normative perspective, when portions of the population live at subsistence or near-subsistence levels, and have access to inadequate housing, food, health care, and education. While theories of distributional justice abound, there is a persuasive argument that people should have access to at least those resources necessary to achieve some sufficient level of autonomy and self-direction.¹⁰⁸

The consequence of these two distributional facts: inequality and populations living at or near subsistence, complicates the picture for developing countries wishing to engage in cost-benefit analysis. First, there may be certain classes of regulatory measures that are simply impermissible on a moral basis, no matter the cost-benefit ratios. For example, if a regulation burdened a group of individuals at or near subsistence, so that their wealth levels fell below subsistence, that regulation would potentially be immoral, even if it did result in aggregate increases in wealth. In order for the regulation to be legitimately adopted, there would have to be

those with less internal wealth inequality). Inequality in these societies, then, may pose a greater threat to well-being than in richer economies.

¹⁰⁶ Smita Narula, *Equal By Law, Unequal By Caste: The “Untouchable” Condition in Critical Race Perspective*, 26 WIS. INT’L L.J. 255, 310 (2008) (“Some have begun to tell the Tale of Two Indias, wherein inequalities are further polarized by globalization’s steady march, and where Indians are anointed into the Billionaire’s Club.”); Ben S. Bernanke, Chairman, Bd. of Governors of the Fed. Reserve Sys., *The Level and Distribution of Economic Well-Being*, Address at the Greater Omaha Chamber of Commerce (Feb. 6, 2007) (transcript available at <http://www.federalreserve.gov/newsevents/speech/Bernanke20070206a.htm>) (“Beyond the effects of technological change, the variety of economic forces grouped under the heading of ‘globalization’ may also have been a factor in the rise in inequality, even as these forces have provided a major stimulus to economic growth and to living standards overall.”).

¹⁰⁷ See Jeff Faux, Carlos Salas & Robert E. Scott, *Revisiting NAFTA: Still Not Working for North America’s Workers* 1 (Econ. Policy Inst., Briefing Paper No. 173, 2006) (citing rising income inequality as a disturbing trend resulting from NAFTA); see also Sandra Polaski, *Jobs, Wages, and Household Income*, in *NAFTA’S PROMISE AND REALITY: LESSONS FROM MEXICO FOR THE HEMISPHERE* 11 (2003), available at <http://www.carnegieendowment.org/files/nafta1.pdf>.

¹⁰⁸ See Ronald Dworkin, *What is Equality? Part 1: Equality of Resources*, 10 PHIL. & PUB. AFF. 185 (1981).

mechanisms of compensation put in place to ensure that those who were negatively affected by the regulation were made whole and did not experience the potentially catastrophic consequences to their well-being of even small negative changes to their wealth.

Second, where inequality is already high, special attention must be paid to ensure that a bad situation is not made worse. Because developing countries already face large distributional problems, it is likely the case that where those problems are exacerbated by a regulation, government would have to take potentially costly steps to counter those effects. Cost-benefit analysis must take these costs into account.

Third, the technical fix that has been used in developed countries of using a single population-wide metric for valuing regulatory benefits results in reasonable outcomes if regulatory burdens are roughly distributed according to wealth—i.e., the wealthier population tends to be more burdened by regulation—and regulations tend to affect income-diverse populations. If regulatory benefits and burdens are not so distributed, then negative wealth transfers and inefficient regulations can arise. For example, if only the bottom quintile is both burdened and benefited by a regulation, but risk valuations are based on the middle quintile, then regulations will be inefficiently strict. Likewise, if only the top quintile is burdened and benefited, they will be inefficiently weak. If the top quintile is benefited, and the bottom quintile is burdened, it would result in a normatively problematic transfer of wealth. As income inequality and segregation by wealth increases, it becomes more likely that regulatory proposals will fall into these problematic categories where use of an average value for risk valuations will have obviously negative economic or normative consequences.

These distributional issues present clear challenges to the expanded use of cost-benefit analysis in developing countries. Specifically, they create a need for the development of more nuanced and sophisticated ways of conducting distributional analysis and incorporating that alongside cost-benefit analysis when assessing the impacts of proposed environmental, public health, and safety policy.

III. OVERCOMING THE BARRIERS

Global cost-benefit analysis, if it is to be successful, will look

different from cost-benefit analysis as currently practiced in developed countries. Although many characteristics of current analysis should remain—including goals of rigor and neutrality, norms of transparency and openness, and the overall orientation toward maximizing the efficiency and effectiveness of regulation—there is need for important changes as well.

A. *Development Economics*

The field of development economics focuses on positive economic questions involving development and developing countries, rather than the normative questions that concern welfare economics. Development economics tries to answer questions about the empirical consequences of policies, or to identify policies associated with long-range economic growth. Whether those policies are good or not is left to the individual policymakers, and development economics does not itself propound any ultimate set of decisionmaking criteria upon which choices should be made.

The positive insights of development economics can help make cost-benefit analysis more useful for decision makers in developing countries because a policy's impact on growth could have major consequences for determining its net benefits. Incorporation of development economics can also potentially help improve the positive legitimacy of cost-benefit analysis if, as a consequence, it is seen as being more responsive to the specific needs and circumstances of developing countries.

Environmental regulation can have effects on several variables that are thought to influence development. For example, capital accumulation has a strong association with economic development.¹⁰⁹ Countries without access to capital have less productive workers,¹¹⁰ have fewer opportunities to participate in the global economy through trade, and rely to a greater extent on agricultural production and raw materials for wealth—subjecting

¹⁰⁹ Shujiro Urata, *Competition Policy and Economic Development in East Asia*, 1 WASH. U. GLOB. STUD. L. REV. 15, 16 (2002); Lan Cao, *Toward A New Sensibility for International Economic Development*, 32 TEX. INT'L L.J. 209, 236 (1997); Alex Y. Seita and Jiro Tamura, *The Historical Background of Japan's Antimonopoly Law*, 1994 U. ILL. L. REV. 115, 138 (1994).

¹¹⁰ See Urata, *supra* note 109.

them to weather risks and highly variable global prices.¹¹¹ Accumulating the wide range of assets classified as capital—from factories to technological know-how—lies at the heart of industrialization and development.

There are a variety of positive and negative impacts that environmental regulation can have on physical capital. From the ecosystem services perspective, “[t]he degradation of ecosystem services represents loss of capital asset.”¹¹² These capital assets are often not accounted for; “[a]s a result, a country could cut its forests and deplete its fisheries, and this would show only as a positive gain in GDP . . . without registering the corresponding decline in assets”¹¹³ According to the Millennium Ecosystem Assessment, this problem is so severe that, “[w]hen estimates of the economic losses associated with the depletion of natural assets are factored into measurements of the total wealth of nations, they significantly change the balance sheet,” taking some countries from positive to negative growth.¹¹⁴ If countries are engaged in practices that convert capital to less valuable uses—for example, by converting intact wetland to intensive farming, or converting intact mangroves to shrimp farming¹¹⁵—they are engaged in a practice of capital destruction.

Influence on foreign direct investment is another important consideration for development. If environmental regulations increase production costs, that could result in a decrease in foreign investment—an important consideration for a developing country to take into account. There are many confounding factors that make the study of the relationship between investment and environmental regulation difficult,¹¹⁶ and the relationship may not

¹¹¹ William S. Eubanks II, *A Rotten System: Subsidizing Environmental Degradation and Poor Public Health With Our Nation's Tax Dollars*, 28 STAN. ENVTL. L.J. 213, 234 (2009) (“In response to depressed global cotton prices, for example, an estimated 40,000 cotton farmers in India committed suicide between 1996 and 2005, while thousands more sold one of their kidneys on the black market for approximately \$800.”).

¹¹² MEA, *supra* note 91, at 9.

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ Both of these are examples where the MEA has found that “the net benefits from the more sustainably managed ecosystem are greater than those from the converted ecosystem.” *Id.* at 10 fig.9.

¹¹⁶ See generally DON FULLERTON, *THE ECONOMICS OF POLLUTION HAVENS* (2006); Madina Kukenova & José Antonio-Monteiro, *Does Lax Environmental*

always be negative: higher environmental standards may also increase investment, by making it easier for firms to attract highly skilled labor,¹¹⁷ or increasing returns to tourism. One important advantage of explicit consideration of this variable is that it can be characterized and its effects estimated as accurately as possible.

Technological development and human capital are also key development variables. Gains in worker productivity brought about by technological development sit at the base of economic growth.¹¹⁸ New fields of development theory in particular have focused on the role of technology and knowledge,¹¹⁹ and worker capacity in facilitating development.¹²⁰ Human capital accumulation takes the form not only of formal education but also of learning-by-doing and on-the-job training.

Environmental regulation has a well-established relationship with technological change. Technological change in response to environmental regulation has been documented in many contexts,

Regulation Attract FDI when Accounting for "Third Country" Effects? (2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1292705; Matthew A. Cole, Robert J.R. Elliott & Per G. Fredriksson, *Endogenous Pollution Havens: Does FDI Influence Environmental Regulations?* (University of Nottingham, Leverhulme Center for Research on Globalisation and Economic Policy Research Paper 2004/20).

¹¹⁷ Chris Elbers & Cees Withagen, *Environmental Policy, Population Dynamics, and Agglomeration*, 3 CONTRIBUTIONS ECON. ANALYSIS & POL'Y 1, 2 (2004).

¹¹⁸ For the long view, see generally ANGUS MADDISON, *THE WORLD ECONOMY: A MILLENNIAL PERSPECTIVE* (2001).

¹¹⁹ Paul M. Romer, *Endogenous Technological Change*, 98 J. POL. ECON. S71, S72 (1990). For a discussion of the role of education in economic growth, see David P. Gardner, *Education and the American Economy*, 1 STAN. L. & POL'Y REV. 75, 76 (1989); Emanuele Baldacci et al., *What Does It Take to Really Help the Poor*, 42 FIN. & DEV. 20, 20 (2005) ("a country with literacy scores above the sample's average . . . experienced an above-average increase in annual per capita GDP growth"). Economists have shown for generations that "[t]o the extent that the productivity changes are caused by technological change, skilled labor becomes relatively more important, and the need for human capital development becomes a crucial factor of continued growth. An educated work force is more adaptable to innovations on the job." ARTHUR BLAKEMORE & BERTHOLD HERRENDORF, *ECONOMIC GROWTH: THE IMPORTANCE OF EDUCATION AND TECHNOLOGICAL DEVELOPMENT* 23 (2009). Compare *id.*, with Richard R. Nelson & Edmund S. Phelps, *Investment in Humans, Technological Diffusion, and Economic Growth*, 56 AM. ECON. REV. 69 (1966) (making this argument). See also KAUSHIK BASU, *ANALYTICAL DEVELOPMENT ECONOMICS: THE LESS DEVELOPED ECONOMY REVISITED* 54 (1997) (noting that the "market underproduces human capital").

¹²⁰ BASU, *supra* note 119, at 33–39 (discussing "O-Ring Theory").

from steps taken to comply with the Montreal Protocol on Ozone Depleting Substances,¹²¹ to power production process changes to reduce costs of the Acid Rain Program in the United States,¹²² to recent technological developments to save the incandescent light bulb in the face of impending energy efficiency rules.¹²³ Some economists have argued that certain types of environmental regulation can lead to “win-win situations, in which social welfare as well as the private net benefits of firms operating under such regulation can be increased,”¹²⁴ in part through technological innovation. Alternatively, some environmental regulations can reduce technological development by increasing the price of inputs or diverting natural resources to other uses.

There are a wide variety of pathways through which environmental regulation can affect human capital. Experience implementing environmental control technology can be easily transferred to other situations where technological upgrades can improve worker productivity. Better environmental amenities can help firms attract and retain high quality workers. Environmental regulation can also contribute more directly to human capital accumulation by reducing exposure to pollution that have harmful effects on health. Long-term and acute conditions can interfere with education and worker productivity, and some pollutants, including neurotoxins such as lead and mercury, can have long-range effects on intellectual capacity.

Some environmental regulation could also threaten human capital accumulation. The distributional effects of environmental policy may be particularly important in this respect. Even in systems where public education is widespread, private actors are called on to make important contributions to human capital accumulation, including giving children proper nutrition and

¹²¹ David G. Victor, *Enforcing International Law: Implications for an Effective Global Warming Regime*, 10 DUKE ENVTL. L. & POL’Y F. 147, 156 n.29 (1999) (“The Montreal Protocol, for example, has strengthened over time in part because technological innovation has made benign substitutions for ozone-depleting substances available to the market.”).

¹²² See A. DENNY ELLERMAN ET AL., *MARKETS FOR CLEAN AIR: THE U.S. ACID RAIN PROGRAM* 221–313 (2000).

¹²³ Leora Broydo Vestel, *New Light in Old Bulbs*, N.Y. TIMES, July 6, 2009, at B1.

¹²⁴ Marcus Wagner, *The Porter Hypothesis Revisited: A Literature Review of Theoretical Models and Empirical Tests* 6 (Ctr. for Sustainability Mgmt. Working Paper, 2003) (discussing the “Porter Hypothesis” and its critics).

attention; paying for school supplies; and allowing children to remain free from overbearing work commitments during adolescence. To the extent that an environmental regulation has negative distributional consequences, especially for the lowest income sectors of society, it may have the effect of reducing expenditures for human capital accumulation and undercutting social efforts at development.

Environmental regulation can affect other important development issues, such as dual-economy problems. One of the persistent challenges of many developing countries is the clustering of positive economic progress, while large portions of the population remain poor.¹²⁵ Often, large productivity in many sectors is hampered by a lack of legal institutions, including strong property rights.¹²⁶ If certain regulations create a barrier to entering the legal economy—for example, by creating burdensome record-keeping requirements¹²⁷ or subjecting small business owners to arbitrary and/or unreviewable action by bureaucrats¹²⁸—it may exacerbate a dual economy problem. Environmental policy can also help to reduce dual-economy problems: for example, preservation programs can be designed to incorporate the

¹²⁵ Hal Blanchard, *Constitutional Revisionism in the PRC: "Seeking Truth from Facts"*, 17 FLA. J. INT'L L. 365, 378 (2005) ("China's modernization policy has . . . exacerbated existing economic disparities between its small fraction of urban elite and the hundreds of millions of peasants far removed from the country's new-found wealth."); INT'L BANK FOR RECONSTRUCTION AND DEV., WORLD DEVELOPMENT REPORT 2008, AGRICULTURE FOR DEVELOPMENT 45 (2007) ("The rural-urban income divide is large and rising in most transforming [developing] economies").

¹²⁶ For a controversial assessment of the importance of property rights in development, see HERNANDO DE SOTO, THE MYSTERY OF CAPITAL: WHY CAPITALISM TRIUMPHS IN THE WEST AND FAILS EVERYWHERE ELSE 6 (2000).

¹²⁷ INT'L BANK FOR RECONSTRUCTION AND DEV., CAN AFRICA CLAIM THE 21ST CENTURY? 224 (2000) ("In many countries restrictive regulations and practices, often aimed at generating rents for officials and favored groups, constrain business activity, affecting both agriculture and industry."); SHAHID JAVED BURKI & GUILLERMO E. PERRY, THE LONG MARCH: A REFORM AGENDA FOR LATIN AMERICA AND THE CARIBBEAN IN THE NEXT DECADE 77 (1997) (discussing effects of unnecessary regulations which result in excess paperwork and administrative costs producing inefficient economic outcomes).

¹²⁸ MUSTAPHA K. NABLI, BREAKING THE BARRIERS TO HIGHER ECONOMIC GROWTH: BETTER GOVERNANCE AND DEEPER REFORMS IN THE MIDDLE EAST AND NORTH AFRICA 120 (2007) ("Studies have found that . . . an honest and efficient bureaucracy emerge as the components [of government] with the best documented and strongest links to economic development and growth.").

participation of local groups and help spur local economic development outside of the urban core.¹²⁹

Overall, there are a number of ways that environmental policy can influence important development variables. Expansion of cost-benefit analysis to provide a clearer picture of the effects of policy choices on development outcomes is likely to make it the tool more useful for decisionmakers operating in a number of difference governance contexts around the globe.

B. *Distributional Analysis*

Given the importance of distributional issues for many developing countries, incorporating distributional effects into cost-benefit analysis will be extremely important in facilitating its acceptance. To do this, choices will have to reflect analytic needs and limitations, as well as social values about how the distribution of costs and benefits should factor into environmental or public health policymaking.

At its most fundamental, distributional analysis is based on an exercise in accounting: not only must aggregate costs and benefits be calculated, but the identity of the parties bearing those costs or receiving those benefits must be determined. Even at this early stage, normative questions arise when an analyst must identify which characteristics, such as region, income, race, gender, age, socio-economic status, business size, or industry, are relevant.

Second, the degree of distributional analysis must be identified. Policy can have a wide range of direct and indirect effects, creating a potentially limitless analytic task if all effects must be estimated. In standard cost-benefit analysis, a traditional decisionmaking rule would require an analysis to stop at the point where the value of the information generated from additional investigation is outweighed by the cost of further research. Distributional analysis does not admit of such a straightforward rule—there needs to be a normative decision about the value of distributional information to determine the analytic resources that should be devoted to this task.

¹²⁹ CLAUDIA SOBREVILA, THE ROLE OF INDIGENOUS PEOPLES IN BIODIVERSITY CONSERVATION: THE NATURAL BUT OFTEN FORGOTTEN PARTNERS 31–32 (2008); see DAVID PEARCE ET AL., VALUING THE ENVIRONMENT IN DEVELOPING COUNTRIES: CASE STUDIES 358 (2002) (noting that burning down forest land for grazing is often of only temporary benefit to migrant farmers).

After gathering basic facts about how costs and benefits are distributed, policymakers must face the question of how distributional concerns should be factored into decisionmaking. One potential method would be to identify a particular population for which any negative changes in wealth would have morally unacceptable consequences.¹³⁰ This type of analysis would identify whether there are uncompensated losses for the worst off in society, and flag those for policymakers.

Another popular approach is equity weighting, in which benefits and costs are treated differently depending on the populations affected.¹³¹ Systems of equity weighting have been put into practice in the UK and by the World Bank.¹³² While equity weighting has been the subject of significant discussion in the economics literature, it remains controversial.

Another important distributional issue arises in the context of policies with intergenerational effects, which are common in the environmental area. In general, future cash flows are less valuable than current cash flows, so cost-benefit analysis in the fiscal context adopts a practice of discounting to account for this fact. The private discount rate is based on the risk-free rate of return and a premium to account for risk.¹³³ The discount rate in the regulatory context is somewhat different and represents the rate at which a society is willing to substitute present day consumption for future consumption.¹³⁴

The debate over the social discount rate has taken on special importance in the context of climate change. The Stern Review,

¹³⁰ See generally JOHN RAWLS, *A THEORY OF JUSTICE: REVISED EDITION* 65–73 (3d. ed. 1999).

¹³¹ See, e.g., Olof Johansson-Stenman, *Distributional Weights in Cost-Benefit Analysis—Should We Forget About Them?*, 81 *LAND ECON.* 337 (2005).

¹³² See H.M. TREASURY, *THE GREEN BOOK: APPRAISAL AND EVALUATION IN CENTRAL GOVERNMENT* 24–25, 91–96 (2003) (discussing United Kingdom's use of equity weighing); Jean Dreze, *Distribution Matters in Cost-Benefit Analysis: Comment on K.A. Brekke*, 70 *J. PUB ECON.* 485, 486 (1998) (discussing the World Bank's prior use of equity weighing).

¹³³ See Peter Z. Grossman, *The Market for Shares of Companies with Unlimited Liability: The Case Of American Express*, 24 *J. LEGAL STUD.* 63, 78 (1995) (discussing capital asset pricing model approach to developing rates of return).

¹³⁴ See Richard L. Revesz, *Environmental Regulation, Cost-Benefit Analysis, and the Discounting Of Human Lives*, 99 *COLUM. L. REV.* 941, 948 (1999) (discussing different applications of discounting in environmental context, especially difference between intra- and inter-generational discounting).

the largest-scale economic assessment that has been conducted of climate change by a government body, for example, used a low discount rate to reflect the moral notion that people in the future should be treated with equal regard,¹³⁵ and found that relatively strict greenhouse gas controls were justified. This finding was subject to criticism from many economists who felt that the low discount rate skewed the results.¹³⁶

Of particular importance for developing countries is the incorporation of a metric for future consumption growth in the discount rate. Developed countries have experienced economic growth for many years, and the most advanced economies generally have relatively mild, though persistent, levels of economic growth. Because they are starting from a lower level, many important developing countries have high rates of economic growth.¹³⁷ As a consequence, to the degree that the discount rate is based on predicted economic growth,¹³⁸ discount rates for developing countries will be higher, implying that the benefits of environmental protections for future generations are lower.

At the same time, developing countries currently enjoy lower levels of consumption today, a fact that would be taken into account in an equity-weighted cost-benefit analysis. If they face relatively higher benefits from an environmental program (as is likely the case with climate change), then equity-weighting would counsel for higher levels of protection. But where cost-benefit analysis discounts future benefits (based on consumption growth), but fails to take into account current differential consumption

¹³⁵ STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE pt. 1, at 31 (stating that a pure rate of time preference near zero was used) (“We take a simple approach in this Review: if a future generation will be present, we suppose that it has the same claim on our ethical attention as the current one.”), available at http://www.hm-treasury.gov.uk/stern_review_report.htm.

¹³⁶ *Id.*; see, e.g., William Nordhaus, *Critical Assumptions in the Stern Review on Climate Change*, 317 SCIENCE 201, 202 (2007) (“[T]he Stern Review’s alarming findings about damages, as well as its economic rationale, rest on its model parameterization—a low time discount rate and low inequality aversion—that leads to savings rates and real returns that differ greatly from actual market data.”).

¹³⁷ See *The World Factbook, Country Comparison: GDP—Real Growth Rate*, CENTRAL INTELLIGENCE AGENCY, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2003rank.html>.

¹³⁸ See STERN REVIEW, *supra* note 135, at pt. 1, 31 for a discussion of the Ramsey equation, which bases the discount rate on a pure rate of time preference and a term based on future consumption growth.

levels, then a bias is created against policies that would aid developing countries: equity is taken into account only when it would decrease the value of benefits for developing countries.¹³⁹

Even in the purely domestic context, care must be taken. If regulatory burdens in the present are imposed on wealthier segments of the population, but regulatory benefits in the future accrue to less wealthy segments of the population, then the assumption of diminishing return to consumption would not necessarily hold. Discounting would have to take into account a fuller picture of the incidence of regulatory costs and benefits. In addition, a high discount rate based on high projected long-term growth could discourage policies with long-term payoffs and ultimately result in reductions in economic growth in the future as the current generation consumes rather than making regulatory investments. Where a very high discount rate is used, there should be additional scrutiny to ensure that policies that are justified by the high rate do not threaten the economic growth that is the basis of a high rate in the first place.

C. *Practical Steps*

As cost-benefit analysis spreads, it will need to be leaner, simplified, and easier to use. Countries facing extreme limits on analytic capacity will not be able to devote substantial resources to regulatory evaluation—the most useful forms of cost-benefit analysis will be those that are easiest to carry out.

Where default values can be generated on the basis of existing literature, they can greatly simplify the analytic task. A great deal of scientific research has been done to estimate the various parameters concerning risk- and health-endpoints that are universally applicable—the dose response curve for a carcinogen can be expected to hold across national borders.¹⁴⁰ Epistemological studies can serve as the basis for establishing defensible default values for a range of the public health impacts of environmental pollutants. Research on certain economic

¹³⁹ This problem is not theoretical—the current “social cost of carbon” used in the United States to assess the benefits of greenhouse gas reduction discounts future benefits, but does not use equity weighting. See INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, *supra* note 20.

¹⁴⁰ This should be true as a general proposition, although when exposure to multiple contaminants is involved, things get more complicated.

questions can also be used to develop default values for parameters such as rates of technological change, productivity returns to increased health, or industry responses to increased compliance costs.

Creating default values for risk preferences poses some more complex problems. Much of the research on this question, including contingent valuation studies that solicit preferences from survey-respondents and labor-market analyses that use wages data and injury risks to statistically infer risk premiums, have been done in developed countries. Applying this research across societies poses some difficulties. It is well known that risk preferences change with wealth, but there may be cultural, social, political, and other factors that influence risk-preferences as well. Some estimates exist for parameters to define a relationship between risk values in wealthy countries and developing countries,¹⁴¹ although they are controversial.¹⁴² Additional research in the field of benefits transfer, which creates parameters for using valuations developed in one setting for a variety of different policy questions,¹⁴³ is likely to significantly improve the usefulness of existing research for developing countries. Where information on benefit transfer can be used to develop default economic values that can be used by a range of countries, it will make the task of cost-benefit analysis significantly more tractable.

Checklists and other off-the-shelf evaluation tools could also prove extremely helpful. In the United States, there are several sets of guidelines for conducting economic analysis of environmental policies that have been developed by the EPA,¹⁴⁴ OIRA,¹⁴⁵ and the Council on Environmental Quality¹⁴⁶ at the national level, as well as by some states.¹⁴⁷ These standardized

¹⁴¹ LISA A. ROBINSON & JAMES K. HAMMITT, *THE VALUE OF REDUCING AIR POLLUTION RISKS IN SUB-SAHARAN AFRICA* 19, 50–51, 56 ex.3.8 (2009), <http://regulatory-analysis.com/robinson-hammit-air-pollution-africa.pdf>.

¹⁴² *Id.* at 19.

¹⁴³ See Ian J. Bateman et al., *Benefits Transfer in Theory and Practice: A Review* (CSERGE Working Paper GEC 2000-25).

¹⁴⁴ U.S. ENVTL. PROT. AGENCY, *supra* note 62.

¹⁴⁵ OFFICE OF MGMT. & BUDGET, CIRCULAR A-4: REGULATORY ANALYSIS 14–15 (2003), available at http://www.whitehouse.gov/omb/circulars_a004_a-4/#a.

¹⁴⁶ COUNCIL ON ENVTL. QUALITY, *PROPOSED NATIONAL OBJECTIVES, PRINCIPLES AND STANDARDS FOR WATER AND RELATED RESOURCES IMPLEMENTATION STUDIES* (2009).

¹⁴⁷ See, e.g., N.Y. STATE GOVERNOR'S OFFICE OF REGULATORY REFORM,

methodological approaches can be disseminated more widely. Variants on cost-benefit analysis that require fewer resources—such as cost-effectiveness analysis or the establishment of “break-even” values¹⁴⁸—can be tailored to meet the needs of developing countries.

International cooperation can also help. To the extent that countries share common problems, steps such as pooling analytic resources between countries or conducting analysis of similar policies across a number of countries can be taken to reduce redundancies and allow developing countries to take advantage of returns to scale. This is especially the case for some of the key issues that will arise on a regular basis—such as distributional analysis and valuation of ecosystem services. Regional collaboration networks have already sprung up to facilitate interchange and exchange of ideas between analysts in different countries.¹⁴⁹ International institutions can also provide a supporting role, building on existing programs to support regulatory impact analysis,¹⁵⁰ by facilitating regional networks, and collecting and disseminating best practices.

These practical measures—creation of default values and benefit transfer methodologies; dissemination of standard guidelines; development of checklists and simplified cost-benefit tools; regional collaboration and capacity pooling; and facilitation of best-practices by international institutions—can all help reduce the start-up costs associated with cost-benefit analysis. Because of the resource constraints faced by governments around the world, cost-benefit analysis that is simpler, more flexible, adaptable to different contexts, and embedded in networks of collaboration and resource sharing will be easier to adopt and become truly widespread.

COST-BENEFIT ANALYSIS IN RULEMAKING: A GUIDE FOR STATE AGENCIES (July 2008).

¹⁴⁸ OFFICE OF MGMT. & BUDGET, 2009 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATION 17 (2009) (discussing break-even analysis).

¹⁴⁹ See, e.g., SOUTH ASIAN NETWORK FOR DEVELOPMENT AND ENVIRONMENTAL ECONOMICS, <http://www.sandeeonline.org>.

¹⁵⁰ See, e.g., ORG. FOR ECON. COOPERATION AND DEV., BUILDING AN INSTITUTIONAL FRAMEWORK FOR REGULATORY IMPACT ANALYSIS: GUIDANCE FOR POLICY MAKERS (2008).

D. *Global Comparison*

As cost-benefit analysis becomes more widespread, the problem of international comparison will grow. The reality of global inequities means that risk valuations will differ by country, meaning that public health and environmental protection will be “worth more” in some countries than in others. As cost-benefit analysis is tailored to meet the needs of developing countries, there is a risk that these international comparisons will grow in salience and undercut the legitimacy of cost-benefit analysis.

Solving this problem will not be easy. There are three potential solutions, all of which have serious drawbacks. The first is to launder the preferences of people in developing countries to exclude risk valuations that are too low. There are potential justifications for such laundering: risks may be misunderstood, and populations could be subject to information processing disadvantages or flawed heuristic mechanisms vis-à-vis comparable populations in rich countries. It is possible that normatively troubling influences on preferences could increase risk-tolerance, such as habituation to involuntary risks associated with poverty, crime, or internal strife. Most controversial would be the claim that preferences developed under conditions of poverty are always coerced, and can therefore be ignored.

There are strong arguments against laundering preferences. If the preferences that serve as the foundation for cost-benefit analysis are manipulated, it is not clear what the results of cost-benefit analysis would show. Typically, a net positive cost-benefit analysis would mean that people would be willing-to-pay more for regulatory benefits than they would be willing-to-pay to avoid the cost imposed by a regulation. If preferences are laundered, then this conclusion no longer holds, and there would have to be a claim that the analysis tracked some important value (such as welfare) distinct from preference satisfaction. While there have been attempts to create a foundation for cost-benefit analysis on the basis of objective welfare criteria,¹⁵¹ in pluralistic countries where there are many acceptable conceptions of the good, arriving at agreement on the content of such objective criteria is extremely difficult.

If cost-benefit analysis is unmoored from preferences, it

¹⁵¹ ADLER & POSNER, *supra* note 67, at 187–88.

creates the real possibility that regulations that pass a cost-benefit analysis will nevertheless make people worse off according to their own estimation. For example, if a workplace safety regulation imposes marginal costs on each unit of labor and reduces wages by more than the workers value the safety benefit, the beneficiaries of the regulation would prefer not to have it. A similar problem arises because adjusting preferences upward in developing countries would result in regressive global transfers of wealth if some of the comparative advantage of workers in developing countries (their willingness to take on greater environmental and public health risks) is foregone.

The second option would be to treat international differences in risk preferences the same way that they are generally treated for internal domestic purposes. Developed countries do not create differing risk valuations for differing populations—they use an average value for the entire population. The use of an average value avoids troubling fairness problems, and, so long as regulatory costs are not focused toward the lower side of the income distribution, results in mild redistribution downward as poor people receive slightly more protection than they would be willing to pay for, but regulatory costs are mostly carried by wealthier portions of the population.

There are several reasons why an average global value for risk preferences is unlikely to be a successful strategy. Global disparities in wealth, coupled with significant demographic clustering around wealth and income, would mean that the assumption underlying the use of an average value in the domestic context—that regulatory costs track wealth—would be less likely to hold. In some cases, poor countries would be locked into adopting regulations that, for them, result in net costs, while rich countries would be precluded from adopting some regulations that, for them, have net benefits. An average value constraint for internal regulation, then, would result in real welfare losses for the purpose of maintaining a single global risk valuation. Even if a compelling case could be made on a conceptual level for a unitary global risk valuation standard, it would essentially be impossible to maintain from a political perspective. It would require that sovereign power over environmental and public health regulation be ceded for the sake of a global value, something that few countries are likely to voluntarily do.

The final option to deal with the problem of international comparison is simply to face the potential political backlash that may result from differing risk valuations, and perhaps make some limited concessions in order to avoid the most obviously troubling consequences. There are several potential such compromises. Direct and obvious risk-transfers to developing countries, for example through transportation of hazardous waste, could be avoided. Where rich countries are causing cross-border risk, for example in the climate change context, policy can be set using the wealthier country's risk preferences, because that is where costs will be imposed. Wealthier countries that want developed countries to adopt stricter regulation in order to lower differences in comparative advantage for attracting industry can create compensation regimes, at the very least through technology transfer. While none of these compromises is strictly economically efficient, they could avoid a potential backlash that ends up costing even more.

In the end, differences in risk valuation call attention to the tremendous problem of wealth inequality at the global level. If it seems striking to a person in the United States or Europe that a person in a developing country is not willing to pay what may seem to be paltry sums of money to avoid very significant risks, that should shock the conscience and show in striking terms the need for real measures to reduce global poverty. The best solution is not to hide away the problem of inequality by laundering preferences or creating an artificial global average value, but is instead to address the issue of inequality head-on.

CONCLUSION

Policymakers around the world face the task of making tough choices that can have significant impacts in their societies in the face of information and time constraints. Cost-benefit analysis, properly reformed to take account of the circumstances of developing countries, can help in making these choices. While the technique will never be value-free or purely technical, it can help clarify value choices and ensure that policymakers are aware of the most efficient way to achieve their goals.

While cost-benefit analysis was developed in advanced countries as a political response to short-term economic downturns, it is a technique that has wide applicability throughout

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the world. Cost-benefit analysis serves the goal of rational decisionmaking by aggregating available information, identifying goals, quantifying uncertainty, and helping political actors make choices that best achieves their goals with the fewest negative consequences. For countries that don't have money to waste, but that have prioritized environmental protection as an important component of sustainable development, it can be the right tool at the right time.