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Determining the Proper Scope of Climate Change Policy Benefits in U.S. Regulatory Analyses: Domestic versus Global Approaches

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Introduction

Economic guidelines for policy assessment generally recommend that policies should be selected to maximize social welfare. The main analytical tool for assessing which policies advance social welfare is benefit-cost analysis. However, in both discussions of social welfare and the articulation of guidelines for benefit assessment, the populations whose welfare should be considered is often not well defined. This ambiguity arises even in Utilitarianism, which is the philosophical basis for benefit-cost analysis. English philosopher Jeremy Bentham described his fundamental axiom of moral action: "It is the greatest happiness of the greatest number that is the measure of right and wrong" (Bentham 1776). Later attempts to measure social welfare, such as Mishan (1981), defined the goal as maximizing net benefits across the "defined society." But who should be included in Bentham's concept of the "greatest number"? Who are the members of Mishan's "defined society"? Whose social welfare matters and whose benefits should be included in a benefit–cost assessment?

The question of whose preferences are to be included in the calculation of net benefits is known as *standing*. However, economic standing has received only limited attention in the scholarly literature, with more recent studies suggesting that the issue of standing cannot be resolved based on principles of benefit-cost analysis. Rather, it depends on the ethical consensus

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of society, especially as standing is represented within the context of legal rights and within policy contexts and their associated statutory guidelines.[1]

Consistent with the approach of defining economic standing based on legal rights, standard benefit–cost practice by U.S. government agencies sums the benefits of a policy across the political jurisdiction whose citizens will bear the cost of the policy. This means, for example, that one would assess a state's expenditures in terms of how much they advance the well-being of its citizens rather than citizens of neighboring states. When evaluating policies that cut across states, regional agreements such as the Colorado River Compact, which allocates water rights across seven western states, are often used to ensure a broader perspective. Note that the issue here is whose preferences are given standing in the benefit-cost analysis. This is separate from the issue of a jurisdiction's citizen altruistically including the welfare of citizens of neighboring jurisdictions among her preferences.

This article focuses on how the scope of the analysis should be defined in the evaluation of climate change policies by U.S. agencies. In particular, should U.S. policymakers assess the benefits of climate change policies from a domestic or a global perspective? The answer to this question raises unresolved institutional and economic issues concerning which populations should be included in the tallies of benefits and costs, and it also has implications for the proper consideration of other international and transboundary effects (e.g., effects of air pollution from the Midwest on the northeastern states) in benefit-cost analyses.

We begin in the next section by approaching the question of the appropriate geographic perspective (i.e., domestic or global) from the standpoint of the public finance literature's treatment of cross-boundary externalities more generally. Using this framework, we then review the current U.S. guidelines for benefit assessment and examine legislative mandates that indicate the proper scope of the policy considerations, as specified by the pertinent laws. We find that despite the global effects of many policies, these legal guidelines have a U.S.-centric perspective. We then examine U.S. agencies' recent unprecedented focus on the global benefits of reducing greenhouse gases (GHGs) based on the guidance of the Interagency Working Group on Social Cost of Carbon, the magnitude of the differences in global versus domestic benefits, and case studies of GHG benefit estimates for a series of energy efficiency regulations. After examining and critiquing the U.S. government's justifications for considering global benefits, we offer other possible rationales for using a global perspective in benefits analysis, including the roles of reciprocity and altruism. We conclude by emphasizing that there is a need for more policy research on the extent to which domestic social cost of carbon (SCC) benefit estimates should account for international impacts.

The Treatment of Cross-Boundary Externalities

A benefit-cost analysis is more likely to suggest an optimal policy response when the political jurisdiction defining who will bear the cost of the policy matches the economic jurisdiction of who will reap the benefits. Yet in some important instances, local policies may result in externalities (e.g., downstream water pollution), in which case the jurisdiction bearing the cost is a *subset* of the broader population reaping the benefits. Likewise, it is possible for local policies to reap domestic benefits by imposing foreign costs (e.g., defense and border protection efforts).

[1]For the debate on standing within the context of benefit-cost analysis, see Whittington and MacRae (1986), Trumbull (1990a, 1990b), Whittington and MacRae (1990), and Zerbe (1991).

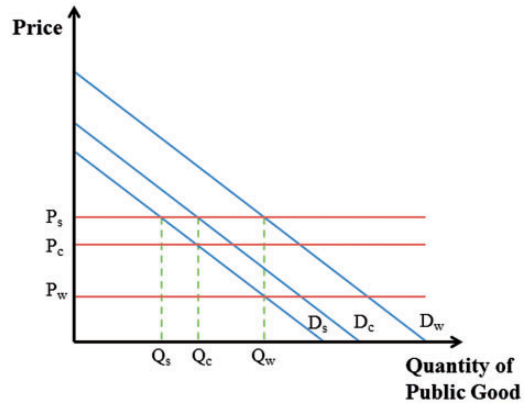

Figure 1 Efficient provision of a public good at the state, country, and world levels

The Provision of Public Goods and Fiscal Federalism

To illustrate how the definition of economic standing affects the optimal policy, figure 1 presents the provision of a public good, such as pollution reduction, at the state, country, and global level. At the state level, the demand curve (D_s) represents the vertical summation of individual demand curves across citizens of the state. The price of the public good (P_s) equals the marginal cost. If the state is able to successfully account for the public aspect of the good, it will provide an amount of the public good (Q_s), which is the efficient amount from the state perspective. However, if the good provides benefits that cross the state's borders, as in the case of addressing downstream water pollution, then there are spillover benefits to other states. These benefits are shown in the country's demand curve (D_c) and suggest that the provision of Q_s falls short of the efficient amount of the public good from the national perspective (Q_c).

In the public economics literature, fiscal federalism allows the federal government to provide incentives for the state government to provide more of the public good than is optimal from the state's perspective. This can be achieved through intergovernmental grants (e.g., see Gramlich 1990). In figure 1, for example, if the federal government were to provide a proportional matching grant of r_c to the state, this would lower the price of the public good to $(1 - r_c) * P_s$ (labeled P_c in the figure), thus providing an incentive to the state to provide the efficient amount of the public good from the country's perspective (Q_c). Of course, determining the correct level of a matching grant is no easy task, and a larger grant would lead the state to provide too much of the public good, resulting in the state free riding off of the national subsidy.

However, if there is no scope for intergovernmental grants (e.g., the state government is not eligible for a grant from the federal government for the provision of the public good), then there is no incentive for the state to incorporate the cross-border benefits into its benefit-cost analysis. In this case, the standard practice for benefit-cost analysis would be to ignore the preferences of citizens outside of the state since they are not bearing any of the costs of providing the good.

Climate Change as a Global Public Good

In the specific case of climate change policies, the benefits of reducing U.S. GHGs across national borders are accompanied by no intergovernmental grants from other countries to the United States. This is illustrated in figure 1 by D_w, which is the global, or worldwide, demand curve. Here the efficient provision of the public good (e.g., improved environmental quality) from the global perspective is Q_w, but from the national perspective, it remains Q_c. In this case, the standard approach to benefit-cost analysis would be to ignore the benefits to citizens of other countries, which is consistent with the view that standing should be considered within the context of legal rights. With this background on the conceptual treatment of cross-boundary externalities, such as climate change, in benefit-cost analysis, we turn next to how U.S. laws define the appropriate scope of benefit assessments.

U.S. Government Guidelines for Benefit Assessment

The proper geographic scope of benefit assessment depends on both the general guidelines for benefit-cost analyses and the specific guidance provided by the relevant legislation. In most cases, the populations that are given standing in a benefit-cost analysis correspond to the political jurisdiction that is bearing the cost of the policy, either directly through providing the good or indirectly through matching grants or other subsidies. This approach is broader than framing the reference population in terms of who paid for the policy, as this is often only a subset of the pertinent population of the jurisdiction that bears the cost. However, responsibility for policy funding does not confer control of the allocation of these funds, as, for example, consumers who pay cigarette taxes or motor-vehicle fees have no special influence over how the funds are spent. Unlike markets for private goods, the total amount of the taxes one pays does not increase a person's leverage over the direction of the policies that are implemented within the political, tax-collecting, jurisdiction. As the subsequent discussion will indicate, both executive orders and statutes provide guidance that defines the proper policy scope from a domestic rather than a global perspective.

Executive Orders and Regulatory Guidance

The proper scope of benefit-cost analyses of regulatory impacts is generally indicated in the executive orders that provide guidance for the executive branch's regulatory oversight process, but they do not address the legality of a particular regulation. Under the Chevron Doctrine (*Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc.*), the courts generally give agencies substantial leeway in interpreting ambiguous statutory guidelines. However, agency discretion with respect to the components of benefit-cost analysis is not unlimited. In fact, Cecot and Viscusi (2015) provide examples of court decisions in which regulations were overturned on the basis of deficiencies in the agency's regulatory impact analyses.

Executive Order 12866

The main policy guidance document for determining the proper scope of benefit-cost analysis in the United States is Executive Order 12866, which was issued by the Clinton administration and has been in place for over two decades (Clinton 1993). The preamble to this executive order

makes clear that the reference point for the pertinent population to be used for analyzing federal regulatory policies is the U.S. citizenry, not the world: "The *American* people deserve a regulatory system that works for them, not against them: a regulatory system that protects and improves *their* health, safety, environment, and well-being and improves the performance of the economy without imposing unacceptable or unreasonable costs on society. . ." (emphasis added).

This emphasis on the effects of regulations on the American people is not a rhetorical flourish used to introduce the regulatory oversight guidelines. This domestic focus is also part of the regulatory oversight structure mandated by Executive Order 12866: "An efficient planning and review process is vital to ensure that the Federal Government's regulatory system best serves the *American* people" (emphasis added).

Circular A-4: the guidance document

In 2003, the U.S. Office of Management and Budget (OMB) developed a guidance document (known as Circular A-4) for regulatory impact analyses that maintained this emphasis on domestic benefits and allowed for the reporting of *foreign* benefits, but only if reported separately: "Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States. Where you choose to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately" (U.S. Office of Management and Budget 2003).

Executive Order 13563

President Obama's Executive Order 13563, issued in 2011, reaffirms the principles established under Executive Order 12866. In the overarching statement of objectives, it refers to *public* health and *our* environment, which presumably refers to the United States rather than the world: "Our regulatory system must protect public health, welfare, safety and our environment while promoting economic growth, innovation, competitiveness, and job creation" (Obama 2011). The statement of regulatory philosophy and principles in this executive order is even more explicit about the domestic focus: "Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the *American* people" (emphasis added).

Statutory Guidance

The regulatory analysis guidance indicates *how* an agency should undertake a regulatory impact analysis. However, the effects the agency should consider are often restricted by the laws governing the particular policies. In the discussion that follows, we present several examples of environmental laws, each of which includes language emphasizing the domestic focus.

The Clean Air Act

The declaration section of the Clean Air Act (CAA) is quite explicit and focuses specifically on the benefits to the "Nation," not the world: "The purposes of this subchapter are—(1) to

protect and enhance the quality of the *Nation's* air resources so as to promote the public health and welfare and the productive capacity of its population" (Clean Air Act §7401(b)(1), emphasis added). Similarly, the provisions pertaining to mobile source pollutants urge the Environmental Protection Agency (EPA) administrator to set standards pertaining to "air pollution which may reasonably be anticipated to endanger public health or welfare" (Clean Air Act §7521(a)(1)). Presumably it is the "public" of the nation that is being referred to in this provision, as no broader set of concerns is included in the stated purposes of the CAA.

Where U.S. pollution endangers the public health or welfare of another country, the CAA allows the U.S. Secretary of State to formally notify the governor of the state in which the emissions originate (Clean Air Act §7415(a)) and to invite representatives of the foreign country to appear at any relevant public hearings concerning the applicable implementation plan (Clean Air Act §7415(b)). At most, these provisions provide an opportunity for effects on other countries to be taken into account, but there is no requirement that, if considered, these effects should receive the same weight as domestic benefits. Moreover, the applicability of this provision is limited to situations in which other nations provide reciprocity to the United States: "This section shall apply only to a foreign country which the Administrator determines has given the United States essentially the same rights with respect to prevention of control of air pollution occurring in that country as is given that country by this section" (Clean Air Act §7415(c)). Unless one can make the case that all countries outside of the United States have granted reciprocal rights to the United States, then none of the provisions pertaining to appearances at public hearings serve as a justification for including the effects of U.S. regulations on all other countries.

Pizer et al. (2014) present an alternative point of view concerning the implications of the CAA for climate change policy, arguing that the use of a global SCC is justified in part because the CAA refers to "global impacts" and does not "preclude a Presidential judgment that U.S. interests are best served via a global SCC." On the first point, we find no references to global impacts in the CAA except for the section permitting invitations to representatives of foreign countries to appear at a public hearing, provided these nations provide reciprocity. With respect to the second point, our reading of the CAA is that it is focused on air quality in the United States; however, we are not suggesting that the CAA *prohibits* the computation of a global SCC.

The Obama administration's report on the SCC seeks to take a more open-ended view of the scope of the benefit effects: "As a matter of law, consideration of both global and domestic benefits is generally permissible; the relevant statutory provisions are usually ambiguous and allow selection of either measure" (Interagency Working Group on Social Cost of Carbon 2010). In a footnote elaborating on this point, the report notes, "It is true that federal statutes are presumed not to have extraterritorial effect, in part to ensure that the laws of the United States respect the interests of foreign sovereigns. But use of a global measure for the SCC does not give extraterritorial effect to federal law and hence does not intrude on such interests" (Interagency Working Group on Social Cost of Carbon 2010). However, as our review of the CAA indicates, this interpretation is problematic. Although it is correct that the U.S. cannot bind other nations to the various environmental laws and regulations issued in the United States, such as the CAA, the lack of applicability of U.S. laws to other countries in no way implies that the benefits to other nations *should* be taken into account when assessing the merits of the policies undertaken under particular U.S. laws. Moreover, there is no apparent basis in the law for giving the same weight to foreign benefits as is given to domestic benefits.

Clean Water Act

The Clean Water Act (CWA) shares this domestic focus. Section 311 of the CWA defines federal authority over natural resources as being limited to those controlled by the United States. In particular, the CWA includes federal removal authority to mitigate hazardous spills into navigable waters and their adjoining shores and hazardous spills "that may affect natural resources belonging to, appertaining to, or under the exclusive management authority *of the United States*" (Clean Water Act §1321(c)(1)(A)(iv), emphasis added). Similarly, the CWA allows for discharge removal when a discharge is large enough to "be a substantial threat to the public health or welfare *of the United States* (including but not limited to fish, shellfish, wildlife, other natural resources, and the public and private beaches and shorelines *of the United States*)" (Clean Water Act §1321(c)(2)(A), emphasis added).

The 1989 *Exxon Valdez* oil spill provides an example of a water pollution event that created externalities that affected citizens of other countries. Following the *Exxon Valdez* oil spill, there was a determination of the magnitude of monetary losses and the subjective impacts on people's personal welfare (Carson et al. 2003). However, the contingent valuation studies of these losses focused on the impacts on U.S. citizens, not on whether the Canadians or Japanese also experienced a decrease in well-being due to the spill. The consent decree with Exxon for damages caused by the spill defined the damages in terms of U.S. resources or, more specifically, resources "belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resource of the fishery conservation zone established by the Magnuson Fishery Conservation and Management Act of 1976. . .), [Alaska], or both the United States and [Alaska]" (Clean Water Act §1321(b)(1)). Thus despite the international impacts of the spill, the scope of pertinent benefits and costs was restricted to domestic effects.

Toxic Substances Control Act

There is also a legal and policy precedent for EPA to focus on domestic benefits and costs in its rulemaking under Section 6 of the Toxic Substances Control Act (TSCA), which prohibits the manufacture, importation, processing, and distribution of asbestos-containing products (Toxic Substances Control Act §2605(a)). In a 1989 rulemaking, EPA excluded the costs to foreign countries (in particular, Canada) from its analysis of the impacts of the asbestos regulation. Cassiar Mining Corporation, a Canadian mining company that operated an asbestos mine, petitioned that the EPA erred by not considering the effects of the ban on foreign countries and workers. In *Corrosion Proof Fittings v. EPA* (1991), the U.S. Court of Appeals, Fifth Circuit, ruled that the Canadian petitioners do not have standing to contest EPA's actions—i.e., that "the EPA was not required to consider the effects on people or entities outside the United States." The court further stated that the list of factors to consider under TSCA include "the effect [of the rule] on the *national* economy," and that "international concerns are conspicuously absent from the statute" (*Corrosion Proof Fittings v. EPA* 1991, emphasis added).

National Environmental Policy Act

Finally, we examine whether the provisions of the 1970 National Environmental Policy Act (NEPA) provide a legislative justification for considering global benefits in U.S. regulatory analysis. Unlike the CAA, CWA, and TSCA, NEPA is an aspirational and procedural statute. This means that a court would not look to NEPA for the statutory justification for a policy.

Instead, it would rely on the specific statutory mandate (e.g., the CAA) that is pertinent to the policy under consideration.

In contrast, Pizer et al. (2014) suggest that NEPA is a legitimate basis for establishing a global perspective for EPA. NEPA recognizes that the United States may often "lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment" (42 U.S.C. §4332(2)(F)). However, this provision of NEPA pertains to participation in international policy efforts, not the agency's policy objectives. In fact, NEPA states that the broader policy objective is to "fulfill the social, economic, and other requirements of present and future generations of *Americans*" (42 U.S.C. §4331(a), emphasis added). Thus, in addition to not being relevant to whether the CAA or other environmental laws provide statutory justification for a global benefits perspective, NEPA ultimately focuses on the benefits to Americans, not the world.

Implications of Statutory Guidance

This review suggests that even when the legal requirements do not limit the agency's flexibility concerning which economic effects to consider, the laws do not alone provide justification for making the scope of the economic assessment as broad as possible. The key economic issue here is not whether considering global benefits violates the law, but instead whether it is appropriate from a policy standpoint to do so. Moreover, there is clearly a mismatch if the implementation of regulations is guided by global preferences, but the laws governing regulatory policies are based on domestic preferences.

Global versus U.S. Benefits of Reductions In Greenhouse Gases

Recent U.S. government analyses of the benefits associated with a reduction of GHG emissions represent a rare instance in which U.S. regulatory impact analyses have used worldwide rather than U.S. benefits as the reference point. We are aware of only one other regulatory impact analysis that has followed this approach—a 1980 environmental impact statement on uranium milling by the U.S. Nuclear Regulatory Commission, which computed the adverse health effects of "continental radiological impacts" (Nuclear Regulatory Commission 1980). The estimated health effects included benefits to citizens of Canada and Mexico as well as those impacts that affected only U.S. citizens. The analysis also included health effects for citizens of Europe and Asia, although these were not counted in the benefit-cost analysis. Nonetheless, in the final uranium mill tailings rule promulgated by the EPA, the regulatory impact analysis did not consider any benefits to people outside of the U.S. (Environmental Protection Agency 1983).

Interagency Working Group on Social Cost of Carbon

In 2007, the U.S. Supreme Court ruled in *Massachusetts v. EPA* (2007) that the EPA had authority to regulate emissions of GHGs should it deem that such emissions are "reasonably anticipated to endanger public health or welfare." EPA's later determination of endangerment to public health and welfare led to a number of regulatory actions to reduce GHGs. Initially

there was variation across agencies (and across rules within agencies) in terms of the appropriate value to use in benefit assessments of the SCC. There was also inconsistency on whether to report only the domestic SCC or to include the global SCC as well (Interagency Working Group on Social Cost of Carbon 2010).[2]

In order to achieve a consistent SCC across agencies and rules, the Interagency Working Group on Social Cost of Carbon (2010) developed the guidelines that provide the basis for assessing the benefits associated with reductions in carbon dioxide (CO_2) emissions. The legality of a particular regulation depends on whether it is consistent with the agency's statutory mandate, not whether it complies with an executive order or guidelines such as those provided by the Interagency Working Group. The Interagency Working Group (2010, 2013) emphasizes the pertinence of this guidance by specifying in the title of their reports that the guidance provided is "Under Executive Order 12866." As the former administrator of the Office of Information and Regulatory Affairs, Cass Sunstein (2014) observed: "The social cost of carbon was the product of an interagency process, and it reflects the official position of the U.S. government. Until it is changed through an appropriate process, it is binding."

The range of SCC estimates

Greenstone, Kopits, and Wolverton (2013) summarize the methodology used by the Interagency Working Group to develop a range of SCC estimates for use in regulatory decision making. The benefit components included were quite broad, as the SCC "is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services" (Greenstone, Kopits, and Wolverton 2013). To assess the value of these benefits, the Interagency Working Group relied primarily on three integrated assessment models and three discount rates to develop estimates of the global SCC per ton of CO_2 of $5, $21, $35, and $65 (in 2007 U.S. dollars) (Greenstone, Kopits, and Wolverton 2013). However, the Intergovernmental Panel on Climate Change (2014) synthesis report states that the SCC range of estimates "lie between a few dollars and several hundreds of dollars per tonne of carbon in 2000 to 2015," a range of uncertainty that dwarfs both the U.S. global SCC and any differences between the domestic and the global SCC.[3]

Approaches for estimating domestic benefits

The Interagency Working Group used two approaches to isolate the U.S. domestic benefit. The first approach was based on estimates in one of the integrated assessment models that permitted a U.S. analysis, and the resulting estimate of the average U.S. benefit is about 7 to 10 percent of the global benefit (Greenstone, Kopits, and Wolverton 2013). The second approach assumes that the domestic share of the benefits is proportional to the current U.S. share of global gross domestic product (GDP), resulting in an estimated domestic benefit that is 23 percent of the global benefit (Greenstone, Kopits, and Wolverton 2013). If, as is likely, the U.S. share of global GDP will decrease throughout the time for which SCC benefits are being assessed, then this value overstates the domestic share.

[2]Note that there were no instances of reporting only the global SCC.
[3]As noted in the introduction, in this article we are not questioning the Interagency Working Group's estimates. Rather our focus is on whether agencies should use the global or domestic SCC benefit estimate for policy evaluation.

Energy Regulations

The Interagency Working Group's benefit assessment guidance for GHG reductions has been included in the benefit assessments of several prominent energy conservation regulations (e.g., fuel economy standards for vehicles and energy efficiency standards for clothes dryers). Although the benefits associated with GHG reductions are relatively small compared with both the regulatory costs and the purported benefits of addressing irrational consumer choices, agencies have touted these regulations as being GHG regulations. For example, the title for the EPA fact sheet read, "EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017–2025 Cars and Light Trucks."[4] In fact, if one were to focus only on the domestic benefits (rather than the worldwide benefits), the GHG benefit component would sometimes be extremely small. It is important to note that although the magnitude of these GHG benefits has been modest, the agencies' adoption of a global rather than a domestic SCC may affect future regulatory decisions. The ability to claim larger GHG benefits may also facilitate agency efforts to elicit political support for these regulations as GHG initiatives.

The EPA, the Department of Energy (DOE), and the Department of Transportation (DOT) currently present the CO_2 benefit range from a *global* standpoint and do not present the domestic benefits. This practice is inconsistent with not only what we consider to be the proper scope of benefit assessment (i.e., a domestic focus), but also OMB's Circular A-4, which calls for the presentation of *domestic* benefits and, if the agency chooses, a *separate* presentation of benefits that occur outside the United States. Thus agency analyses that present only the global benefits of a regulation are not calculating the effects that are pertinent from the standpoint of U.S. citizens. This practice serves to inflate the level of estimated benefits by a factor of 4.2 to 14.3 depending on which end of the estimated domestic benefits share of global benefits is used, based on the estimated domestic benefits share being as high as 23.7 percent and as low as 7 percent. Thus, although imposing a global perspective on benefits will increase the apparent desirability of the policy, it overstates the actual benefits to the American people. To illustrate how agencies have implemented the Interagency Working Group's approach to calculating the benefits of GHG reductions, we examine several major energy efficiency regulations.

Corporate average fuel economy standards for passenger vehicles and light trucks

The most expensive energy efficiency regulation is the corporate average fuel economy (CAFE) rule for passenger cars and light trucks, proposed in similar rules by both the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and the EPA.

The NHTSA analysis estimated that its proposed CAFE standard for passenger cars and light trucks would generate $45.6 billion in benefits from reducing GHGs (National Highway Traffic Safety Administration 2011; Gayer and Viscusi 2013). However, based on the Interagency Working Group's methodology, the domestic benefits are only $3.2 billion to $10.7 billion, which account for about 1 percent of the total benefits estimated for the regulation and a somewhat larger fraction of the estimated costs of $132.1 billion.

[4]See fact sheet EPA-420-F-12-051, https://www3.epa.gov/otaq/climate/documents/420f12051.pdf.

The components of the EPA analysis of the CAFE standard are similar to the NHTSA analysis in that the agency claims $46.4 billion in benefits from reducing GHGs. As in the NHTSA analysis, this amount accounts for a small share of the $444.0 billion in total benefits and the $192.0 billion in total costs (Environmental Protection Agency 2011; Environmental Protection Agency and Department of Transportation 2011; Gayer and Viscusi 2013). As in the NHTSA analysis, the domestic benefits from reducing GHGs are only $3.2 billion to $10.7 billion.

Corporate average fuel economy for heavy-duty vehicles

The analysis of the GHG benefits in the assessment of proposed CAFE standards for heavy-duty vehicles is similar, with the GHG-related benefits playing a comparable minor role.[5] More specifically, for these fuel economy standards, the EPA and NHTSA estimate the benefits associated with GHG reduction at $5.7 billion, which comprises less than 10 percent of the total claimed benefits for the rule. Again, the analysis focuses on the GHG benefits to the world. The domestic component of the GHG benefits is only $0.4 billion to $1.3 billion, or 0.7 to 2.2 percent of total claimed benefits. Thus, focusing on only the domestic share of the GHG benefits makes it clear that these CAFE efforts should not be categorized as GHG policies.

Clothes dryers, room air conditioners, and incandescent lamps

The relative share of the domestic benefits of GHG reductions for other energy conservation rules appears to be somewhat greater, although the agencies' analyses are less complete in terms of categorizing and tallying all benefit and cost components. For the clothes dryer energy efficiency rule, the value of the GHG reductions is $0.093 to $1.49 billion (Department of Energy 2011; Gayer and Viscusi 2013). The domestic share ranges from $0.007 billion to $0.342 billion, far less than the single benefit component of consumer cost savings of $3.01 billion. In the case of the room air conditioners rule, which mandates energy efficiency standards for air conditioners, an estimated $0.077 billion to $1.16 billion in GHG benefits would be generated worldwide, but only $0.005 billion to $0.267 billion domestically, both of which are much smaller than the claimed financial savings to consumers of $1.47 billion (Department of Energy 2011; Gayer and Viscusi 2013). Finally, the highly publicized regulation that phases out general service incandescent lamps would generate $0 to $16.34 billion in worldwide GHG benefits, with a domestic range of $0 to $3.76 billion (Department of Energy 2009; Gayer and Viscusi 2013). These minor GHG benefits are dwarfed by the agency's $64.2 billion estimate of financial savings to consumers.

Clean power plan

More recently, in 2014, the EPA proposed regulations to limit CO_2 from existing power plants (Environmental Protection Agency 2014). Using a 3 percent discount rate, EPA estimated the climate benefits of this rule to be $30 billion in 2030 (Environmental Protection Agency 2014). In contrast, by using the Interagency Working Group's methodology for determining domestic benefits, the rule would yield climate benefits of only $2.1 billion to $6.9 billion, which is less than the $7.3 billion in estimated compliance costs for the rule. However, GHG benefits were

[5]The data presented here are from Environmental Protection Agency and National Highway Traffic Safety Administration (2011) and Gayer and Viscusi (2013).

not critical to the proposed rule's overall benefit-cost performance, as EPA also claims that the rule has substantial air pollution cobenefits associated with reductions in particulate matter and ozone.

Summary

Notwithstanding standard benefits assessment principles, previous executive orders, and guidance by the OMB, the focus of the energy efficiency regulatory impact analyses has been on global rather than domestic benefits. Moreover, these global GHG benefits account for a small share of total project benefits, and when only the domestic share is considered, the relative role of these benefits is reduced even further. We next examine (and critique) the Interagency Working Group's rationale for focusing on global GHG benefits.

A Critique of the Interagency Working Group's Justifications for a Worldwide Perspective

The Interagency Working Group on Social Cost of Carbon offered two justifications—reiterated in Greenstone, Kopits, and Wolverton (2013)—for their focus on global over domestic benefits.

GHGs Are a Global Externality

The first justification was that GHGs involve "a global externality: emissions of most GHGs contribute to damages around the world even if they are emitted in the United States. Consequently, to address the global nature of the problem, the [. . .] SCC should incorporate the full (global) damages caused by GHG emissions" (Greenstone, Kopits, and Wolverton 2013). We agree that GHG emissions present a problem of the global commons, and therefore that a globally efficient policy would internalize the full global social cost of these emissions.[6] Just as state environmental policies are unlikely to lead to efficient environmental outcomes from the national perspective, national environmental policies are unlikely to lead to efficient global outcomes. However, this does not provide a justification for giving full standing to foreigners in domestic environmental benefit-cost analyses. Although pollutants such as mercury and sulfur dioxide have cross-border effects, the EPA has not previously used this as a justification to give the same weight to the benefits to citizens of other countries (in a benefit-cost analysis) as to the U.S. citizens bearing the cost of the regulation.

Climate Change Requires Global Solutions

The Interagency Working Group's second justification for focusing on global rather than domestic benefits was that "climate change is a problem that the United States cannot solve alone. Even if the United States were to reduce its GHG emissions to zero, it would be insufficient to avoid substantial damages from climate change" (Greenstone, Kopits, and Wolverton 2013). This statement is true, but again it fails to justify why the U.S. should incorporate benefits to other countries from regulations whose costs will be borne only by the United States. As

[6]This issue is well established in the economics literature (Aldy et al. 2010).

discussed earlier, the role of fiscal federalism is to provide incentives to sub-jurisdictions to consider the spillover costs to other jurisdictions, which provides an element of reciprocity that addresses public goods or externalities that cross borders. Without such reciprocity on the international level, there is no clear justification for one nation to include the benefits to other nations from policies for which the one nation incurs all of the costs. Indeed, proactive efforts to reduce GHG emissions in the United States might even make it possible for other countries, particularly less developed countries, to reduce their own efforts to restrict GHG emissions, thereby undermining reciprocity.

The Need for Symmetry in the Treatment of Benefits and Costs

There also needs to be symmetrical treatment of benefits and costs in the analysis if the issue of standing is resolved in favor of a global perspective. That is, if one is taking global benefits into account, one should also take global costs resulting from U.S. actions into account. The Interagency Working Group does allude to the issue of who bears the cost in a footnote that attempts to justify why it does not weigh the benefits to poor countries more than the benefits to rich countries, as might be suggested by diminishing marginal utility. They argue that such "equity weights" should not be considered because "emissions reductions also impose costs, and hence a full account would have to consider that a given cost of emissions reductions imposes a greater utility or welfare loss on a poor nation than on a wealthy one" (Interagency Working Group on Social Cost of Carbon 2010). It is inconsistent to dismiss equity weights for benefits across countries because they ignore the cost side, but then suggest that global benefits should be the focus of an analysis that ignores the distribution of costs, which fall entirely on the domestic population. Moreover, once the analysis has shifted to a global perspective, the appropriate equity weights to apply are the global equity weights, which are based on preferences throughout the world, not the domestic equity weights, which are based on the preferences of U.S. citizens.

Other Potential Justifications for a Worldwide Perspective

While our view is that the Interagency Working Group has not presented a compelling case for taking a fully global perspective on benefit assessment, it is nevertheless worthwhile to explore other possible justifications for counting global benefits. Going back to first principles, the foundation for any benefit approach is how it relates to society's willingness to pay for the benefit: "The standard benefit measure is the willingness to pay of those affected by the policy to reduce the risk of the bad outcome that would have occurred compared to the base case" (Farrow and Viscusi 2011). By applying this benefits principle, we have identified two potential rationales for taking a global rather than a domestic perspective: reciprocity and altruism.

Reciprocity

The Interagency Working Group is correct to point out the global nature of the climate change problem and thus the need for "international agreements to reduce emissions and in encouraging other nations, including emerging major economies, to take significant steps to reduce emissions" (Interagency Working Group on Social Cost of Carbon 2010). As discussed in a

recent Organization for Economic Cooperation and Development (OECD) report (Smith and Braathen 2015), one could advocate for a global rather than a national perspective because (1) the global perspective is consistent with many OECD countries' commitments to reduce GHG emissions and (2) there will be negligible national benefits unless a country's policies are part of a coordinated international effort. Ultimately, however, the appropriate benefit value will be the benefits derived by the individual country's citizens, which will be, in part, a function of the effectiveness of international agreements. Thus the analytical challenge is to assess the marginal impact of GHG reductions on global emissions, taking into account all such international ramifications. There is reciprocity in climate GHG mitigation policies if U.S. GHG reductions lead other countries to reduce their GHG emissions, thus providing a benefit to U.S. citizens.

Nature and level of reciprocity

The appropriate nature and level of any reciprocity adjustment is unclear because the interdependencies are not well understood. U.S. GHG policies could lead other countries to become more lax in their policy efforts, reducing U.S. benefits. This means that the implication for reciprocity could be negative. Given ongoing international efforts, a more likely scenario is that the reciprocity value is positive. However, the magnitude will depend on the effectiveness of such agreements in reducing emissions. The recent United Nations Framework Convention on Climate Change Paris Agreement does not assign targeted reductions to each country. Rather, it sets an aspirational goal of limiting global temperature increases to 1.5 degrees Celsius and establishes a process to report and publicly review each country's progress. One might hypothesize that using a global SCC in U.S. policy analyses may itself serve to promote such international cooperation. However, increasing the U.S. carbon reduction benefits by a factor of 4.4 to 14.3 (by counting the entire global share of SCC benefits rather than just the domestic share), which in effect presumes full reciprocity throughout the world, is an arbitrary adjustment that has no clear relationship to any actual or prospective reciprocity effects. Indeed, such adjustments could conceivably be too low if U.S. policy initiatives trigger inordinately greater efforts by other nations.

Policy practices of other countries

Consideration of the approaches to the SCC in other countries offers little insight into the extent of any reciprocity effects. Some developed countries do include SCC estimates in evaluating their climate regulations. The United Kingdom was perhaps the first government to consider the SCC, using integrated assessment models to arrive at a range of estimates. These values were widely, if not consistently, applied in regulatory policy deliberations, but they were not used in determining national carbon emission goals (Watkiss and Hope 2011).

In contrast to the American approach of estimating the cost of damages caused by climate change, as reflected in the Interagency Working Group reports and studies such as Muller and Mendelsohn (2007), in 2009 the United Kingdom adopted a "target consistent resource-cost approach" to estimate carbon costs. This method avoids the question of who has standing because it focuses on the cost of abatement that allows the United Kingdom to meet its carbon reduction goals. Those goals were not explicitly set with regard to any SCC, but rather were the result of the Kyoto Protocol, the stipulations of the European Union (EU) climate change and energy package, and emissions reduction targets set in the UK's Climate Change Act and

national mandatory five-year carbon budgets (Department of Energy and Climate Change 2014). The United Kingdom annually establishes carbon values based on the cost of abatement. For 2014, the low, central, and high estimates of the cost of abatement were £0, £4.48, and £12.38 ($0, $6.98, and $19.28) per ton of CO_2, and these costs are projected to increase to £38.83, £77.66, and £116.50 ($60.49, $120.97, and $181.47; all in 2014 terms) in 2030 as abatement goals become more ambitious (Department of Energy and Climate Change 2014).[7] Although the 2014 values fall on the lower end of the global SCC estimates used by the Obama administration, the future values are higher.

The EU requires its regulatory impact assessments "to identify those impacts, both inside and outside the EU, that are likely to occur as a consequence of implementing the policy" (European Commission 2009) and to address whether the options "have an impact on the environment in third countries that would be relevant for overarching EU policies, such as development policy" (European Commission 2009). However, the issue of whether to include international costs and benefits is left to the discretion of the person preparing the regulatory impact assessment, so long as the report reflects "how and to what extent the evaluation of international impacts has been taken into account in the comparison of options." The EU Commission Delegated Regulation No. 244/2012, Annex II uses projections of the SCC that "currently assume a price per tonne of EUR 20 until 2025, EUR 35 until 2030 and EUR 50 beyond 2030, measured in real and constant prices EUR 2008."

Although Australia's environmental policies make no mention of using an SCC, the government enacted a carbon tax based on its international emissions reduction targets. The tax was set at $23 per ton of carbon in 2013 and $24.15 in 2014, which is consistent with a global SCC approach, as it is in the range of the global SCC estimates used by the Obama administration (Swoboda and Talberg 2014). However, the tax was repealed on July 17, 2014, with some politicians basing the repeal on the lack of an international trading system. Thus there is no compelling rationale for adopting a global SCC based on other countries' practices.

Might U.S. climate efforts spur reciprocity?

The empirical question concerning reciprocity is whether efforts by the United States to reduce GHG emissions might spur other countries to reduce GHGs so as to generate benefits that are 4.4 to 14.3 times as great as the direct domestic benefits of the U.S.-only policy. This means that U.S. actions would have to generate substantial reductions in other countries' GHG emissions. However, there are many practical obstacles to such a reciprocity effect. For the reciprocity to occur, the amount of the U.S. domestic policy commitment to reducing GHG emissions would have to be known, publicized, and incorporated into the policy initiatives taken by other countries, likely within the context of an international treaty. Given the incentives for free riding in public goods situations, including those involving externalities, and especially situations involving a global pollutant like GHGs, international reciprocity may prove to be an elusive goal.

[7]These values apply to policy evaluations for sectors covered by the European Union Emissions Trading System (ETS). The United Kingdom has different valuation methodologies for noncovered sectors and for time periods of more than about 15 years into the future.

Altruism

Altruism is also a possible rationale for using a global rather than a national perspective. There are two dimensions in which there could be altruistic concerns—altruistic concerns across countries at a point in time and altruistic concerns across time, including future generations. First, there could be altruistic concerns at any point in time with respect to effects beyond the country's borders, which may result in U.S. citizens suffering a welfare loss from the adverse effects that climate change has on citizens of other countries. For example, if climate change leads to flooding in Venice or famines in Africa, there may be concern with the well-being of those affected. There may also be altruistic concerns across time with respect to future generations.

Altruism and standing

The altruistic concern, over both geography and time, is distinct from the issue of economic standing. If we give a person in this or a future generation economic standing, it means giving autonomous consideration to the person, which means we must sum her willingness to pay within the net benefit calculation. Altruism is demonstrated by including the person (in this or a future generation) in the preferences of a person that has economic standing.[8] The nature of altruism suggests that the willingness to pay for providing goods to oneself is usually greater than one's willingness to pay to provide the good to another person. For example, average spending on consumption greatly exceeds the average value of charitable contributions, which may be suboptimal from a social welfare perspective (Kaplow 1995). This implies that if U.S. citizens have altruistic concerns about the impacts of climate change on noncitizens, then this altruism would be represented by applying a fractional (not full) weight to the benefits to noncitizens.

Noncitizens versus future generations

There is a direct parallel between the consideration of economic standing for noncitizens and the consideration of economic standing for future generations. In Stern (2007), future generations were treated the same as the current generation, in effect giving them full economic standing. In Stern's view, it is ethically indefensible to apply a positive time discount rate when considering climate policies, with the exception of accounting for the possibility of extinction. Thus Stern (2007) used a time discount rate of 0.1 percent per year, with the deviation from zero reflecting the probability of extinction. As noted by Nordhaus (2007), the use of a near-zero time discount rate leads to the conclusion that extreme and immediate action is needed to address climate change. In many ways, Stern's (2007) approach of using a near-zero time discount rate is similar to the Obama administration's decision to treat the benefits to citizens of other countries in the same way that it treats the benefits to U.S. citizens. In both cases, the scope of benefits has been separated from proper consideration of the domestic benefits to current citizens.

[8]Rowell (2015) describes the distinction between economic standing and altruism as being standing versus scope. Within this framework, economic standing may include the preferences of domestic and foreign persons, while scope includes domestic and foreign impacts. In each case, there is also the global counterpart for the sum of these preferences and impacts. We also recognize the potential role for domestic altruism with respect to foreign impacts and the role of reciprocity.

Conclusions: Research Priorities and Implications

Grounding GHG benefit assessments in the preferences of the domestic population leads to a quite different perspective on the SCC than has been adopted in recent U.S. policies. Our approach is based on statutory guidance, administrative requirements for regulatory analysis, and standard practice of benefit-cost analysis. Our examination of the justification for benefits assessments of GHG emission reductions suggests that U.S. government officials have strayed beyond the typical approach for defining the scope of benefits assessment. We find that the Interagency Working Group has not provided a compelling justification for its approach. A more convincing justification for giving (partial) economic standing to citizens of other countries should be based on explicit reciprocity and demonstrable feelings of altruism. Unfortunately, there is currently no sound empirical basis for determining the appropriate level of such reciprocity and altruism adjustments. Thus one priority for future research is the examination of these issues.

It is important to note that putting equal weight on the GHG benefits to noncitizens and citizens represents a dramatic shift in economic policy. If such a global perspective were applied broadly to the benefit assessments of all policies, it would substantially alter the allocation of societal resources in a manner that would not reflect the preferences of the U.S. citizens who are bearing the cost of such policies and whose political support is required to maintain such efforts.

Rather than adopting either a global or a narrower domestic perspective on benefits, we believe that there should be increased emphasis on trying to determine the appropriate value of the global impacts of SCC reductions from a domestic perspective. This would require actual empirical support rather than optimistic assumptions of full global reciprocity. A related task would be to obtain a more meaningful estimate of the domestic share of the SCC benefits over the pertinent time frame for policy assessment.

Addressing these benefit issues is not infeasible, but it will require a stronger empirical foundation and a stronger theoretical basis than simply assuming that global benefits are tantamount to domestic benefits. There needs to be a thorough evaluation of the broader implications of this fundamental restructuring of policy assessment practices before researchers and policymakers jettison the current emphasis on the valuation of domestic benefits and costs.

These issues are particularly sensitive because there is a fundamental policy conflict between maintaining the integrity of benefit-cost analysis and the desire to promote climate change policies that are efficient from a global perspective. Empirical evidence on the extent of reciprocity and altruism, or a change in statutory guidance, could help to resolve this conflict. Otherwise, there is a danger that the precedent of adopting a global benefits perspective in the case of SCC could have broad ramifications for the practice of benefit-cost analyses in a wide range of policy contexts that have international consequences.

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