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Determining the Proper Scope of Climate Change  
Benefits<sup>\*</sup>

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## ABSTRACT

Although benefit assessment principles are well established for defined populations, there has been very little attention to how one defines the scope of the pertinent population for the assessment. Whose social welfare matters and whose benefits should be included in the assessment? Should there be any linkage between the benefits and the political jurisdiction whose citizens are paying for the policy? For national regulatory policies, the norm has been to assess benefits to U.S. citizens. This article reviews the norms for the scope of benefit assessment based on executive orders and the laws governing risk and environmental regulations. Recent assessments of climate change policies have shifted to a worldwide benefits approach, leading to a substantial increase in the estimated benefits. In 2010 the Obama Administration's Interagency Working Group on Social Cost of Carbon developed the guidelines that provide the basis for the assessment of the benefits associated with reductions in carbon dioxide emissions. Based on the estimates in one integrated assessment model that permitted a U.S. analysis, the estimate of the average U.S. benefit is about 7 to 10 percent of the global benefit. Alternatively, if one does not rely on a direct benefit estimate but assumes that the domestic share of the benefits is proportional to the current U.S. share of the global GDP, then the domestic benefit is 23 percent of the global benefit. This article reviews specific examples of such practices for energy efficiency regulations and the broader benefit assessment guidelines that have been developed for greenhouse gas initiatives, including the CAFE rule for passenger cars and light trucks, the carbon pollution rule for existing power plants, the clothes dryer rule, and the phase out of general service incandescent lamps.

Keywords: climate change, benefit-cost analysis, willingness to pay

JEL Codes: H43, Q48, K32

## 1. Introduction

Economic guidelines for policy assessment routinely urge that one should select policies to maximize social welfare. The main analytical tool for assessing which policies advance social welfare is benefit-cost analysis. In discussions of social welfare and articulation of guidelines for benefit assessment, the scope of the analysis is often not well-defined. The ambiguity arises even in Utilitarianism, which is the philosophical basis for benefit-cost analysis. Jeremy Bentham described his fundamental axiom of moral action as “the greatest happiness of the greatest number that is the measure of right and wrong.”<sup>4</sup> Later approaches to measuring social welfare, such as that of Mishan, defined the goal as maximizing net benefits across the “defined society.”<sup>5</sup> But who should be included within the universe of Bentham’s concept of the “greatest number?” Who constitutes 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 counted in the calculation of net benefits is known as *standing*. There has been limited academic discussion about economic standing, with the more recent studies suggesting that standing cannot be resolved based on principles of benefit-cost analysis but instead depends on the ethical consensus of society, especially as it is represented within the context of legal rights.<sup>6</sup>

Consistent with the context of defining economic standing based on legal rights, standard benefit-cost practice sums the benefits across the political jurisdiction consisting of the citizens who are bearing the cost of the policy. Therefore, one might assess expenditures by a city in terms of how much they advance the well-being of its citizens rather than citizens of neighboring rural towns. Likewise, a policy paid for by the citizens of a state will be evaluated based on the benefits to the citizens of the state rather than citizens of neighboring states. Note that the issue here is whose preferences are given autonomous standing in the benefit-cost analysis. This is separate from the issue of a citizen of a jurisdiction altruistically including the welfare of citizens of neighboring jurisdictions among her preferences, an issue that we revisit later in the paper.

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 there may be externalities resulting from local policies, in which case the jurisdiction bearing the cost is a subset of the broader citizenship reaping the benefits.

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<sup>4</sup> Jeremy Bentham. 1976. “A Fragment on Government.”

<sup>5</sup> E.J. Mishan. 1981. *An Introduction to Normative Economics*. Oxford University Press.

<sup>6</sup> For the debate on standing within the context of benefit-cost analysis, see Whittington and MacRae, Jr. (1986), Trumbull (1990a), Whittington and MacRae, Jr., (1990), Trumbull (1990b), and Zerbe, Jr., (1991).

Consider the example in Figure 1 of a public good, such as pollution reduction, provided 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,  $mc$ . If the state is able to successfully account for the public good nature of the good, it will provide  $Q_s$  amount of the public good, which is the efficient amount from the state perspective. However, if the good provides benefits that cross the state's borders, such as is the case when addressing downstream water pollution or certain types of air pollution, then there are spillover benefits accruing to other states. These benefits are represented in the country's demand curve,  $D_c$ , and suggest that the provision of  $Q_s$  falls short of the efficient amount of  $Q_c$  from the national perspective.

The role of fiscal federalism is for the federal government to incentivize 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.<sup>7</sup> In Figure 1, for example, if the federal government were to provide a matching grant of  $r_c$  to the state, this would lower the price to the state to  $(1-r_c)*mc$ , providing an incentive to the state to provide  $Q_c$  of the public good, which is the efficient amount from the country's perspective. Of course, determining the correct level of a matching grant is no easy task, and a grant larger than  $r_c$  would lead to the state providing too much of the public good, inefficiently free-riding off of the national subsidy.

The problem arises when there is no scope for intergovernmental grants. If the state government represented in Figure 1 is not eligible for a grant from the federal government for the provision of the public good under consideration, then there is no incentive to incorporate the cross-border benefits, and 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.

In this article we focus on the issues for policies pertaining to climate change, in which the benefits of reducing U.S. greenhouse gases (GHGs) cross national borders, and in which there are no intergovernmental grants from other countries to the United States for the policies under consideration. This is represented in Figure 2, which recreates Figure 1, with the addition of a global, or world-wide, demand curve,  $D_w$ . The efficient provision of the good, such as improved environmental quality, from the global perspective is therefore  $Q_w$ , whereas from the national perspective it remains  $Q_c$ . The standard approach to benefit-cost analysis in this case would be to omit the benefits to citizens of other countries, consistent with the position that standing must be considered within the context of legal rights.

To take an extreme example of the role of legal rights, it is broadly accepted that a benefit-cost assessment of a government jobs program should not include the costs of a loss of illicit gains to criminals, since the legal and political framework is clear about the absence of rights for illegal

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<sup>7</sup> See, for example, Gramlich (1990), chapter 10.

gains.<sup>8</sup> Similarly, application of the standard legal and regulatory framework, suggests that citizens of other countries should not have standing within a benefit-cost analysis of a U.S. regulation. Where there is uncertainty about the legal rights and thus the economic standing of non-citizens, the analyst at the very least should provide a sensitivity analysis by reporting benefits and costs to non-citizens separately from the impacts that affect only citizens (and perhaps including partial weights for the benefits to non-citizens).

We begin in Section 2 with a review of the current U.S. guidelines for benefit assessment and representative legislative mandates that indicate the proper legal scope of the policy considerations. In Section 3 we examine the government's assessment of the value of GHG reduction benefits, the agencies' recent unprecedented focus on global benefits the magnitude of the differences in global versus domestic benefits, and case studies of GHG benefit estimates for a series of energy efficiency regulations. In Section 4, we examine and critique the administration's justification for considering global benefits, as well as offering other possible justifications. We offer conclusions regarding the proper scope of benefit assessment in Section 5.

## **2. Governmental Guidelines for Benefit Assessment**

The proper scope of benefit assessment depends on both the guidelines for benefit-cost analyses generally and the guidance provided by the pertinent legislation. As already discussed, in most instances the pertinent populations that are attributed standing in a benefit-cost analysis should correspond to the political jurisdiction that is bearing the cost, either directly through providing the good or indirectly through matching grants or other subsidies for provision of the good. Such framing of concerns is broader than framing the reference population in terms of who paid for the policy as it is often only a subset of the pertinent population in the jurisdiction that bears the cost. Consumers who pay cigarette taxes or motor-vehicle fees have no special influence over how the funds are spent, and unlike markets for private goods, the total amount of the taxes one pays gives a person no greater leverage over the direction that policies promoted within the political, tax-collecting, jurisdiction should take.

There are many indications of the proper scope of regulatory impact analyses in the executive orders that provide guidance for the oversight process. The main policy guidance document that has been in place for 20 years is Executive Order 12866, which was issued by the Clinton Administration.<sup>9</sup> The Preamble to this executive order makes clear that the pertinent population reference point for analyzing federal regulatory policies is the U.S. citizenry, not the world: "The

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<sup>8</sup> For an exception, see Long, Mallar, and Thornton (1981), for an example in which a reduction in stolen property to criminals was counted as a cost of the Job Corps program.

<sup>9</sup> William J. Clinton, "Executive Order 12866: Regulatory Planning and Review," *Federal Register*, vol. 58, no. 190, 51735 (Oct. 1993).

*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 focusing on effects on American people is not rhetorical flourish employed to introduce the regulatory oversight guidelines. There is also a domestic focus in the regulatory oversight structure mandated by this executive order: “An efficient planning and review process is vital to ensure that the Federal Government’s regulatory system best serves the *American* people” (emphasis added).

Subsequently, the U.S. Office of Management and Budget (OMB) developed a guidance document (known as Circular A-4) for regulatory impact analyses that maintained an emphasis on domestic benefits but permitted the reporting of foreign benefits 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.”<sup>10</sup>

President Obama’s Executive Order 13563 reaffirms the principles established under Executive Order 12866 (which presumably includes reaffirming the regulatory focus on U.S. citizens). In the overarching statement of objectives, this document refers to *public* health and *our* environment, which presumably pertain to the U.S. 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.”<sup>11</sup> The statement of regulatory philosophy and principles in President Obama’s executive order maintains a more explicit 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).

The regulatory analysis guidance indicates how an agency should undertake a regulatory impact analysis, but which effects can be considered is often circumscribed by the laws governing the particular policies. With respect to U.S. laws pertaining to air pollution policies pertinent to recent climate change initiatives, a useful starting point is to consider the provisions of the Clean Air Act. This law is administered by the U.S. Environmental Protection Agency (EPA).

The declaration section of the 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

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<sup>10</sup> U.S. Office of Management and Budget, Circular A-4, Sept. 2003, p. 15.

<sup>11</sup> Barack Obama, “Executive Order 13563: Improving Regulation and Regulatory Review,” *Federal Register*, vol. 76, no. 14, 3831 (Jan. 2011).

quality of the *Nation's* air resources so as to promote the public health and welfare and the productive capacity of its population.”<sup>12</sup> (emphasis added). Similarly, the provisions pertaining to mobile source pollutants urge the Administrator to set standards pertaining to “air pollution which may reasonably be anticipated to endanger public health or welfare.”<sup>13</sup> Presumably the “public” being referred to in this provision is that of the nation, as there is no indication of a broader set of concerns with respect to the purposes of the CAA.

In situations in which U.S. pollution endangers the public health or welfare of another country, the CAA permits the Secretary of State to formally notify the governor of the state in which the emissions originate,<sup>14</sup> and invite representatives of the foreign country to appear at pertinent public hearings on the applicable implementation plan.<sup>15</sup> At most, these provisions provide some opportunity for effects on other countries to be taken into account, but there is no requirement that they receive the same weight as domestic benefits if they are considered. Moreover, the applicability of this provision is very limited to situations in which other nations provide reciprocity to the U.S.: “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.”<sup>16</sup> Unless one can make the case that all countries outside of the U.S. have granted these rights to the U.S., then the aforementioned provisions do not serve as a justification for including representatives of effects on other countries in the policy debate.

The Obama Administration’s report on the social cost of carbon seeks to take a more open-ended view of the scope of the benefit effects that can be considered: “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.”<sup>17</sup> 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.”<sup>18</sup> As the review of the CAA indicates, this interpretation appears to be quite problematic. It is correct that the U.S. cannot bind other nations to various laws and regulations issued in the United States under the various environmental laws such as the CAA. But the inapplicability of U.S. laws to other countries in no way implies that 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

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<sup>12</sup> 42 U.S.C.A. S 7401(b)(1)(West).

<sup>13</sup> 42 U.S.C.A. S 7521(a)(1)(West).

<sup>14</sup> 42 U.S.C.A. S 7415(a)(West).

<sup>15</sup> 42 U.S.C.A. S 7415(b)(West).

<sup>16</sup> 42 U.S.C.A. S 7415(c)(West).

<sup>17</sup> Interagency Working Group on Social Cost of Carbon (2010), p. 10.

<sup>18</sup> *Ibid*, p. 10.

in the law for giving equal weight to benefit effects outside the United States as is given to domestic benefits.

The domestic focus is shared by other environmental legislation such as the Clean Water Act (CWA). Section 311 of the CWA defines federal authority over natural resources as being limited to those controlled by the United States. In particular, there is federal removal authority to include mitigation of 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*.”<sup>19</sup> Similarly, the CWA directs 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*)”<sup>20</sup> (emphasis added). This focus is of practical consequence with respect to externalities that affect citizens of other countries. After the Exxon Valdez Oil Spill, there was a determination of the magnitude of monetary losses and the subjective impacts on people’s personal welfare. However, the contingent valuation studies of these losses focused on the impacts on the U.S. citizenry, not on whether the Canadians or Japanese also experienced a decrease in well-being because of the harm caused by the spill. The consent decree with Exxon for damages cause by the 1989 spill defined the damages in terms of United States 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].”<sup>21</sup>

There is also a legal and policy precedent for EPA to focus on domestic benefits and costs in its rulemaking prohibiting the manufacture, importation, processing, and distribution of asbestos-containing products as required by Section 6 of the Toxic Substances Control Act (TSCA).<sup>22</sup> In its 1989 rulemaking, EPA decided to exclude the costs to foreign countries (in particular, Canada) from its analysis. 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, that “the EPA was not required to consider the effects on people or entities outside the United States.”<sup>23</sup> The Court further stated that the list of factors to consider under TSCA include

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<sup>19</sup> 33 U.S.C. section 1321 (c)(1)(A)(iv).

<sup>20</sup> 33 U.S.C. section 1321 (c)(2)(A) (emphasis added).

<sup>21</sup> 33 U.S.C. section 1321(b)(1)

<sup>22</sup> 15 U.S.C. section 2605(a)

<sup>23</sup> *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201 (5th Cir. 1991), section 1209.

“the effect [of the rule] on the *national* economy,” and that “international concerns are conspicuously absent from the statute.”<sup>24</sup>

Even in other policy situations in which the legal constraints do not limit one’s flexibility with respect to the economic effects that can be considered, that alone does not provide justification for the scope of the economic assessment being as broad as is legally permitted. The key economic issue is not whether it violates the law to consider benefits to the world, but rather whether it is appropriate from a policy standpoint to do so. Further, there is an evident mismatch if the implementation of regulations is guided by global preferences whereas the laws governing regulatory policies are based on domestic preferences.

### **3. World Benefits vs. U.S. Benefits for Reductions in Greenhouse Gas Emissions**

The recent governmental analyses of the benefits associated with reduction of GHG emissions represent a rare instance in which U.S. regulatory impact analyses have used a worldwide benefits reference point rather than a U.S. reference point. The only previous instance of which we are aware is from an environmental impact statement on uranium milling by the U.S. Nuclear Regulatory Commission in 1980.<sup>25</sup> The Commission computed the adverse health effects of “continental radiological impacts,” which included benefits to citizens of Canada and Mexico. The health effects were provided in addition to the effects on only U.S. citizens, thus granting full standing to citizens of Canada and Mexico. The analysis also included health effects for citizens of Europe and Asia, although these were not counted in the benefit-cost analysis. Nonetheless, for the final uranium mill tailings rule promulgated by the EPA, the regulatory impact analysis considered only nearby effects so did not consider any benefits to people outside of the U.S.<sup>26</sup>

The 2007 Supreme Court ruling in *Massachusetts v. EPA* gave the EPA authority to regulate emissions of greenhouse gases should it deem that such emissions are “reasonably anticipated to endanger public health or welfare.”<sup>27</sup> EPA’s later determination of endangered 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) on the appropriate value to use in benefit assessments of the social cost of carbon (SCC). There was also inconsistency on whether to report only the domestic SCC or whether to include the global SCC as well (although there were no instances of reporting only the global SCC).<sup>28</sup>

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<sup>24</sup> Ibid.

<sup>25</sup> Nuclear Regulatory Commission (1980).

<sup>26</sup> Environmental Protection Agency (1983).

<sup>27</sup> *Massachusetts v. EPA*, No. 05-1120 (U.S. Apr. 2, 2007).

<sup>28</sup> Interagency Working Group on Social Cost of Carbon (2010).p. 3.

In order to achieve standardization across agencies and rules for the SCC, in 2010 the Obama Administration's Interagency Working Group on Social Cost of Carbon developed the guidelines that provide the basis for the assessment of the benefits associated with reductions in carbon dioxide (CO<sub>2</sub>) emissions.<sup>29</sup> 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 increase flood risk, and the value of ecosystem services."<sup>30</sup> To assess the value of these benefit effects, the Working Group relied primarily on three integrated assessment models and three discount rates to develop estimates of the global SCC per ton of CO<sub>2</sub> of \$5, \$21, \$35, and \$65 (\$2007).<sup>31</sup> While there have been various critics of the climate change benefit estimates, with some such as Carlin (2011) suggesting that they are too high and others such as Ackerman and Stanton (2012) suggesting that they are too low, in this article we do not question the Working Group's estimates of the global benefits. Instead we focus on the composition of the SCC estimate. Is the estimate of the domestic share of the SCC reasonable, and should agencies use the global SCC benefit estimate for policy evaluation?

There are two approaches that the working group used to isolate the U.S. domestic benefit, which its analyses pegged at being in the 7 to 23 percent range of global benefits. Based on the estimates in one integrated assessment model that permitted a U.S. analysis, the estimate of the average U.S. benefit is about 7 to 10 percent of the global benefit.<sup>32</sup> Alternatively, if one does not rely on a direct benefit estimate but assumes that the domestic share of the benefits is proportional to the current U.S. share of the global GDP, then the domestic benefit is 23 percent of the global benefit.<sup>33</sup> If, as is likely, the U.S. GDP becomes a decreasing share of the world GDP throughout the long time frame for which SCC benefits are being assessed, then this value overstates the domestic share. Future research will potentially refine the domestic share estimate.

The implementation of the Working Group's benefit assessment guidance for GHG has entered the benefit assessments for several prominent energy conservation regulations. Although the benefits associated with GHG reductions are relatively small compared to regulatory costs and other benefit components, agencies have touted these regulations as GHG regulations. If one were to focus on the domestic benefits rather than the worldwide benefits, the GHG benefit component would sometimes be extremely small.

It is noteworthy that the agencies currently present the CO<sub>2</sub> benefit range from a global standpoint and do not present the domestic benefits, contrary to policy guidance. This practice is not only inconsistent with what we consider to be the proper scope of benefit assessment, but is also inconsistent with OMB's Circular A-4, which provides guidance to agencies on how to

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<sup>29</sup> Interagency Working Group on Social Cost of Carbon (2010).

<sup>30</sup> Ibid, p. 2.

<sup>31</sup> Ibid, p. 33.

<sup>32</sup> Ibid, p. 11.

<sup>33</sup> Ibid.

conduct regulatory impact analyses, and which calls for presentation of domestic benefits and, if the agency chooses, a *separate* presentation of benefits outside the United States. In contrast, agency analyses that only present the global benefits are not calculating the pertinent effects from the standpoint of U.S. citizenry. This failure serves to inflate the level of estimated benefits by a factor of 4.4 to 14.3 depending on which end of the estimated domestic benefits share is used. Thus, imposing a global perspective on benefits will increase the apparent desirability of the policy but will overstate the actual benefits to the American people.

To see how agencies have implemented this approach, consider the most expensive energy efficiency regulations, which are those directed at fuel economy standards through the corporate average fuel economy (CAFE) rule for passenger cars and light trucks. Both the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and the U.S. Environmental Protection Agency (EPA) proposed similar rules to require greater fuel economy. The details of the proposed regulations are quite similar, as are the requirements. But there are some differences, such as the NHTSA rule permitting improvements in air conditioning systems as a means for meeting the energy efficiency standard rather than improvements in fuel economy alone. Given the substantial overlap in the proposed regulations and the similarity of their associated regulatory impact analyses, we consider each of the agencies' analyses in turn.

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.<sup>34</sup> However, assessing these benefits in a manner that is consistent with the methodology developed by the Working Group, only 7 to 23 percent of these benefits would be domestic benefits. As a result, the domestic benefits amount is only \$3.2 billion-\$10.7 billion. These domestic benefits constitute about 1 percent of total benefits estimated for the regulation and a somewhat larger fraction of the estimated costs of \$132.1 billion.

Given the similarity of the proposed regulatory requirements under both the NHTSA and EPA versions of the CAFE standards, the components of the EPA analysis are similar in that the agency claims \$46.4 billion in benefits from reducing GHGs. As in the NHTSA analysis, this amount constitutes a small share of total benefits of \$444.0 billion and total costs of \$192.0 billion.<sup>35</sup> In the EPA case as in the NHTSA analysis, considering only the domestic share of the GHG benefits reduces the SCC benefits amount substantially to \$3.2 billion-\$10.7 billion. Notwithstanding the guidance of OMB Circular A-4, it is the benefits to the world that are the focal point of the GHG portion of the assessment rather than focusing on the domestic benefits with the world benefits perhaps indicated in a sensitivity analysis.

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<sup>34</sup> NHTSA (2011), Table 13 and Gayer and Viscusi (2013) provide supporting data.

<sup>35</sup> EPA and DOT (2011), Table III-82; EPA (2011), Table 1; and Gayer and Viscusi (2013) provide supporting data.

There is a similar analysis of GHG benefits in the assessment of proposed CAFE standards for heavy-duty vehicles, and the GHG-related benefits play a similarly minor role.<sup>36</sup> For these fuel economy standards, EPA and NHTSA estimate benefits associated with GHG reduction of \$5.7 billion, which comprises less than 10 percent of the total claimed benefits for the rule. Although the analysis focuses on the GHG benefits to the world, if one focuses on only the domestic component, the GHG benefits are only \$0.4 billion to \$1.3 billion, or 0.7 to 2.2 percent of total claimed benefits. Focusing on only the domestic share of the GHG benefits makes clear that it is a misnomer to categorize these various CAFE efforts as greenhouse gas policies.

The relative value 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 rule, the value of GHG reductions is \$0.093-1.49 billion, but once again the agency's analysis frames the benefit assessment in terms of the global benefits not domestic benefits.<sup>37</sup> The domestic share range is from \$0.007 billion-0.342 billion, far less than a single benefit component of consumer cost savings of \$3.01 billion. In the case of room air conditioners, the rule would generate \$0.077 billion-1.16 billion in GHG benefits worldwide, but only \$0.005 billion-0.267 billion domestically, each of which is much smaller than the claimed financial savings to consumers of \$1.47 billion.<sup>38</sup> Finally, the highly publicized and controversial regulation that would phase out general service incandescent lamps will generate a range of \$0-16.34 billion in GHG benefits, or a domestic range of \$0-\$3.76 billion.<sup>39</sup> These amounts do not account for the claimed desirability of the regulation as the GHG benefits are dwarfed by the purported estimated financial savings to consumers of \$64.2 billion.

More recently, the EPA proposed regulations to limit CO<sub>2</sub> from existing power plants.<sup>40</sup> For this rule, EPA estimated climate benefits amounting to \$30 billion in 2030 using a 3 percent discount rate.<sup>41</sup> However, assessing these benefits in a manner that is consistent with the methodology developed by the Working Group, only 7 to 23 percent of these benefits would be domestic benefits. As a result, the domestic benefits amount is only \$2.1 billion-\$6.9 billion, which is less than the estimated compliance costs for the rule of \$7.3 billion. (Note, however, that EPA also claims substantial air-pollution co-benefits for this rule, associated with reductions in particulate matter and ozone.)

Notwithstanding standard benefits assessment principles, previous executive orders, and OMB guidance, the focus of the energy efficiency regulatory impact analyses has been on global

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<sup>36</sup> The data below are from EPA and NHTSA (2011, Table VIII-33), and Gayer and Viscusi (2013).

<sup>37</sup> DOE (2011, 22550-22551, Tables V-47 and V-51), and Gayer and Viscusi (2013). These statistics are all for the 3 percent discount case. The agency also prepared an analysis for the 7 percent discount rate case, but this higher rate was not applied to the GHG reductions.

<sup>38</sup> DOE (2011, 22553-22554, Tables V-51 and V-52) and Gayer and Viscusi (2013).

<sup>39</sup> DOE (2009) and Gayer and Viscusi (2013).

<sup>40</sup> EPA (2014).

<sup>41</sup> EPA (2014), Table 2.

benefits rather than domestic benefits. These global GHG benefits constitute a small share of total project benefits, and considering only the domestic share would reduce their relative role in benefit assessments even further. However, as was shown in Gayer and Viscusi (2013), the financial savings component of the estimated benefits is also largely conjecture and certainly overstated. If the speculative private savings component of benefits is ignored, then the GHG benefits would play a more prominent role. Comparing global GHG benefits alone to costs will not serve to justify any of the proposed or final energy efficiency regulations, and the gap is much greater once only the domestic portion of benefits is considered.

#### **4. Possible Justifications of a Worldwide Perspective**

The Interagency Working Group on Social Cost of Carbon offered two justifications for their focus on global over domestic benefits.<sup>42</sup> The first justification was that GHGs involve “a global externality: emissions of most GHGs contribute to damages around the world even when they are emitted in the United States. Consequently, to address the global nature of the problem, the SCC must incorporate the full (global) damages caused by GHG emissions.”<sup>43</sup> This seems more like a tautology than a justification, as the question of whether foreigners have economic standing in benefit-cost analysis on environmental policies of course only arises when considering global pollutants, or at least pollutants that cross any national borders. The economic justifications for considering domestic benefits, as well as the guidance offered by OMB to consider domestic benefits and only offer global benefits as desired as a supplement, only apply when considering pollutants that have cross-border effects. Pollutants such as mercury and sulfur dioxide also have cross-border effects, but EPA has not previously used this as a justification to treat the benefits to citizens of other countries as receiving the same weight in a benefit-cost analysis as for the U.S. citizens bearing the cost of the regulation.

The second justification offered by the Interagency Working Group on Social Cost of Carbon was that “climate change presents a problem that the United States alone cannot solve. Even if the United States were to reduce its GHG emissions to zero, that step would be far from enough to avoid substantial climate change. Other countries would also need to take action to reduce emissions if significant changes in the global climate are to be avoided.”<sup>44</sup> This statement is true, but again fails to justify why the U.S. should incorporate benefits to other countries for regulations in which the U.S. alone is bearing the costs. As discussed earlier, the role of fiscal federalism is to incentivize sub-jurisdictions to consider the spill-over costs of other jurisdictions, which provides an element of reciprocity in order to address public goods or externalities that cross borders. Absent this reciprocity on the international level, there is no clear

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<sup>42</sup> Greenstone, Kopits, and Wolverton (2013) offers a reiteration of the justifications for global benefits by key members of the Interagency Working Group.

<sup>43</sup> Interagency Working Group on Social Cost of Carbon, p. 10.

<sup>44</sup> Ibid, pp. 10-11.

justification for one nation to include the benefits to other nations for policies that incur costs domestically. Indeed, it is even possible that pro-active efforts to reduce GHG emissions in the U.S. might make it possible for other countries, particularly less developed countries, to reduce their efforts to restrict GHG emissions, thereby undermining reciprocity.

There also needs to be symmetrical treatment of benefits and cost in the analysis if the standing issue is resolved in favor of a global perspective. If one were to take into account global benefits, one should also take into account global costs resulting from U.S. actions. The Interagency Working Group on Social Cost of Carbon alludes to the issue of who bears the cost in a separate footnote in which they attempt to justify why they do not weigh the benefits to poor countries more than the benefits to rich countries, as might be suggested by diminishing marginal utility. Their reasoning is 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.”<sup>45</sup> It seems inconsistent to dismiss equity weights for benefits across countries because they ignore the cost side, but to 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 moved to a global perspective, the pertinent equity weights that must be applied are the global equity weights based on preferences throughout the world, not the equity weights that are derived based on the preferences of the U.S. citizenry.

While in our view the Interagency Working Group on Social Cost of Carbon has not presented a compelling case for taking a fully global perspective on benefit assessment rather than a U.S. perspective, it is nevertheless worthwhile to explore the reasoning that might lead one to count GHG benefits to the world rather than just the U.S. Going back to first principles, the linchpin of 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.”<sup>46</sup> Two potential rationales that we have identified for taking a global perspective rather than a domestic perspective are reciprocity and altruism.

The Interagency Working Group on Social Cost of Carbon is correct to point out the global nature of the problem of climate change 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.”<sup>47</sup> However, this perspective would suggest that the focus on global benefits in a U.S. policy should be contingent on the level of reciprocity from other nations in considering their own climate policies. To the best of our knowledge, no other countries include the effects to the U.S. in evaluating their domestic climate policies. The

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<sup>45</sup> Ibid, footnote 7, p. 11.

<sup>46</sup> See Farrow and Viscusi (2011), p. 9.

<sup>47</sup> Interagency Working Group on Social Cost of Carbon, p. 11.

question is whether efforts by the United States to reduce GHG emissions might spur reciprocity by other countries to do so as well, generating domestic benefits that are 4.4 to 14.3 times as great as the direct domestic benefits of the U.S.-only policy. This is doubtful. The actions undertaken under specific United States laws, such as the Clean Air Act, are not tantamount to treaty commitments that can establish a formal basis for matching the efforts undertaken domestically. For the reciprocity to occur, the amount of the domestic policy commitment to reducing GHG emissions would have to be known, publicized, and incorporated in the policy initiatives taken by other countries, likely within the context of an international treaty. Given the well-known incentives to be a free rider in public goods situations, including those involving externalities, and in particular situations involving a global pollutant like GHGs, international reciprocity is elusive, and it would therefore be inappropriate to assume that there is a global benefits multiplier effect of the magnitude above without further evidence of such a relationship.

An altruism rationale is also possible, but there is more than one dimension on which there could be altruistic concerns. There could be altruistic concerns at any point in time with respect to effects outside of the country's borders. U.S. citizens may suffer a welfare loss from the risk that climate change could affect citizens of other countries. If global warming leads to flooding in Venice or famines in Africa, there may be concern with the well-being of those affected. Such altruism may also pertain to species that may be adversely affected by climate change, such as polar bears, and might even include geographical features such as glaciers that have melted. The other dimension in which there may be altruistic concerns is across time with respect to future generations. Given the substantial time lag before GHG policies will have any perceptible effects on the climate, altruistic concerns linked to the policy outcomes associated with reduced GHG emissions will typically involve both an across country and an intertemporal aspect.

The altruistic concern, both over geography and over time, is distinct from the question of economic standing. For a person, or for that matter a polar bear, in this or in a future generation, to have economic standing, is to give autonomous consideration to the person (or bear) and thus sum her (or its) willingness to pay within the net benefit calculation. Altruism is demonstrated by including the person or bear, in this or in a future generation, within the preferences of a person with economic standing. The nature of altruism, supported by empirical evidence, suggests that the willingness to pay for providing a good to another person or to an animal, in this or in future generations, is less than that person's (or animal's) willingness to pay for the good. This implies that, if U.S. citizens have altruistic concerns for non-citizens regarding climate change, then this should be represented by applying a fractional (not full) weight to the benefits to non-citizens.

There is a direct parallel between the consideration of economic standing for non-citizens and the consideration of economic standing for future generations. In the Stern Review on the Economics of Climate Change (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 in considering climate policies, except insofar

as to account for the possibility of extinction.<sup>48</sup> The use of a near-zero time discount rate leads to the conclusion that extreme and immediate action is needed to address climate change.<sup>49</sup> In many ways, this is similar to the administration's decision to count the benefits to citizens of other countries the same as citizens of the U.S.

## 5. Conclusion and Implications

Examination of the justification of benefits assessments for GHG emission reductions suggests that government officials have gone outside the typical practice for defining the scope of benefits assessment. The justifications offered by the Interagency Working Group on Social Cost of Carbon offer weak justification for this approach. Our review suggests more convincing justification in which explicit reciprocity would justify giving economic standing to citizens of other countries and demonstrable feelings of altruism would justify partial economic standing to citizens of other countries.

It is important to note that granting the GHG benefits to non-citizens equally to the benefits to citizens represents a dramatic shift in policy, and if applied broadly to all policies, would substantially shift the allocation of societal resources. The global perspective would likely shift immigration policy to one of entirely open borders, as the benefits to granting citizenship to poor immigrants from around the world would dominate any costs to current U.S. citizens. It would suggest a shift away from transfers to low-income U.S. citizens towards transfers to much lower-income non-U.S. citizens, elevating policy challenges such as eradicating famine and disease in Africa to the most pressing concerns for U.S. policymakers, trumping most domestic efforts in terms of their impact on social welfare. And a shift in policy towards fully counting the costs and benefits towards citizens of all other countries would suggest a drastic change in defense policy. A shift in policies to foster such efforts, while in many cases worthwhile, would not be consistent with the preferences of the U.S. citizens who are bearing the cost of such programs and whose political support is required to maintain such efforts.

Rather than adopt a global or narrow domestic perspective on benefits, there should be increased emphasis in trying to distinguish what the pertinent value of the global impacts of SCC reductions are from a domestic perspective. This effort will also entail a related task of obtaining 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 requires a stronger empirical foundation and a stronger theoretical basis than assuming that global benefits are tantamount to domestic benefits.

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<sup>48</sup> The Stern Review used a time discount rate of 0.1 percent per year, with the justification of deviating from zero being the probability of extinction.

<sup>49</sup> For a critique of the Stern Review's use of a near-zero discount rate, see Nordhaus (2007).

Should there be a shift to a global benefit-cost perspective despite the many attendant problems, there would need to be a much more rigorous and balanced evaluative structure. If global benefits are counted, one should also count global costs. At present, the GHG policy assessment experience is one in which agencies apparently are permitted to pick and choose what perspective to take and which benefits and costs to count. As a result, there will be an incentive to engage in cherry picking whereby agencies will count global effects that are favorable to the agency's agenda and ignore global impacts that put the agency's concerns in an unfavorable light.

Explicit, well-defined guidance is needed to replace the recent movement to a rudderless policy assessment approach. This guidance also must specify how the distributional weights applied to global effects will be determined rather than assuming a default value of a weight equal to effects for the U.S. citizenry. If global consequences are permitted to govern the terms of the benefit-cost analysis, then the selection of policy initiatives likewise should be governed by global considerations, subject to compliance with U.S. law. Whether it makes sense to routinely expand the scope of the assessed policy impacts beyond the citizenry of the nation bearing the costs is highly problematic. What is clear at this juncture is that the recent expansion of GHG benefit assessments to include global impacts merits much more scrutiny and justification than it has received to date. There should be a thorough evaluation of the broader implications of this fundamental restructuring of policy assessment practices before jettisoning the current emphasis on the valuation of domestic benefits and costs.

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Figure 1: Efficient provision of public good at state and country level

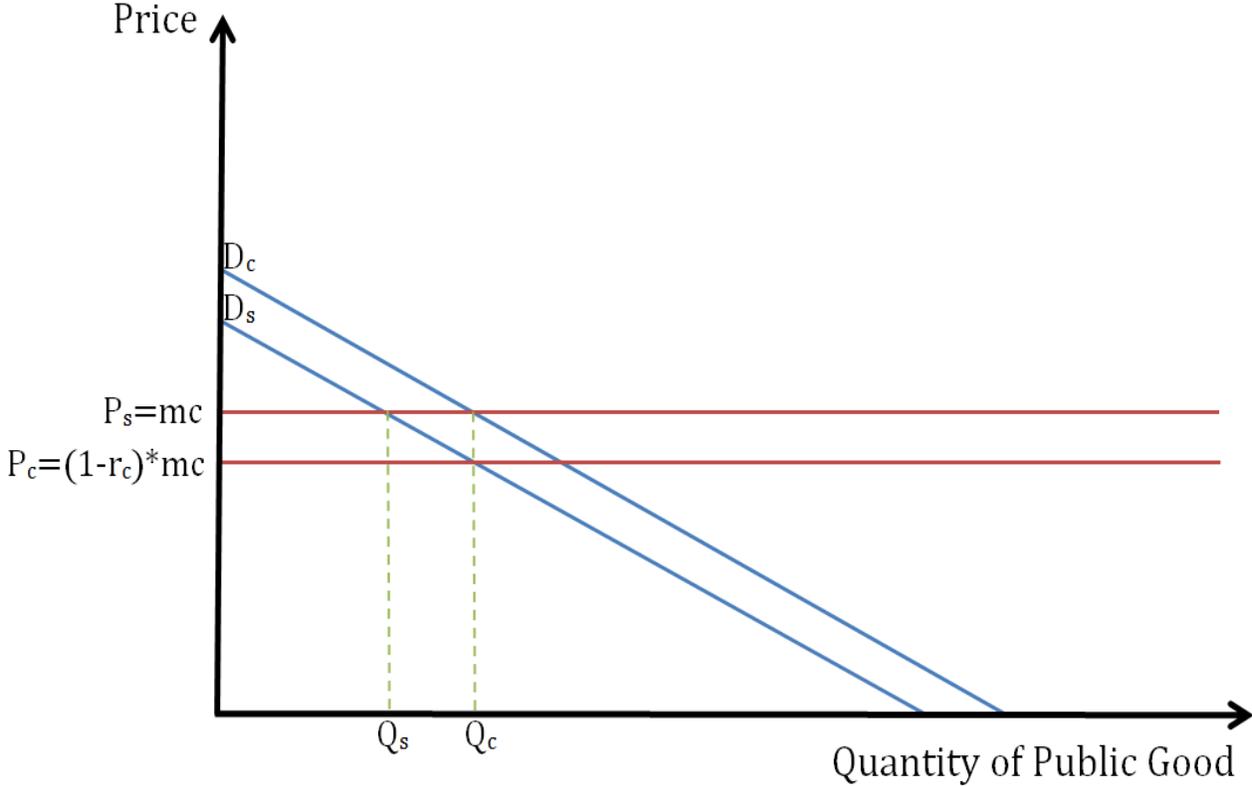


Figure 2: Efficient provision of public good at state, country, and world level

