NOTE

A COST-BENEFIT ANALYSIS–BASED INTERPRETATION OF RECIPROCITY UNDER CLEAN AIR ACT SECTION 115(C)

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Section 115 of the Clean Air Act provides for the regulation of international pollutants, and has been considered as a potential source of authority for regulating greenhouse gas emissions. In order to trigger the authority of the Environmental Protection Agency ("EPA") to regulate under Section 115, EPA's Administrator must determine that the relevant foreign countries have given the United States "essentially the same rights" as Section 115 gives those countries. This Note proposes a novel interpretation of this reciprocity requirement based on cost-benefit analysis ("CBA"). On this CBA-based interpretation, the reciprocity requirement is satisfied where the benefits that the United States receives from all countries' emission reductions outweigh the costs of reducing its own emissions.

The CBA-based interpretation is consistent with trends in administrative law toward requiring agencies to consider the costs and benefits of regulation, and with a plausible reading of Section 115 as giving foreign countries the right to mutually beneficial emission reductions. The CBA-based interpretation also has legal and policy advantages: it may help avert challenges to regulation of greenhouse gas emissions under Section 115 based on the major questions doctrine, it may show that climate regulation is cost justified based on domestic climate benefits even if ancillary benefits and foreign benefits are not considered, and it may represent a rational strategy for approaching international environmental negotiations that could

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lead to an efficient outcome in the case of climate change if adopted by all parties.

This Note illustrates the CBA-based interpretation of reciprocity by applying it to the United States' pledge under the Paris Climate Agreement.

INTRODUCTION

SECTION 115 of the Clean Air Act ("CAA") provides for the regulation of pollutants that endanger public health and welfare in

foreign countries.[1] It is one of the CAA provisions that has been considered as a potential source of authority for regulating greenhouse gas ("GHG") emissions.[2] Recently, Section 115 has been receiving increased attention from commentators in light of the Paris Climate Agreement and the uncertain fate of the Clean Power Plan.[3]

Under Section 115, the Administrator of the Environmental Protection Agency ("EPA") shall require states to revise their State Implementation Plans ("SIPs") to prevent or eliminate international air pollutants if two conditions are satisfied. First, the Administrator must have reason to believe, based on "reports, surveys or studies from any duly constituted international agency," that the pollutant(s) to be regulated "cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country."[4] Second, the Administrator must determine that the foreign country where the endangerment occurs "has given the United States essentially

[1] 42 U.S.C. § 7415 (2012).

[2] See, e.g., Michael Burger et al., Legal Pathways to Reducing Greenhouse Gas Emissions Under Section 115 of the Clean Air Act, 28 Geo. Envtl. L. Rev. 359, 359–60 (2016). Other CAA provisions that have been considered as potentially providing EPA with authority to regulate GHG emissions include Section 111, 42 U.S.C. § 7411 (standards of performance for new and existing major stationary sources—the Clean Power Plan was promulgated under this section), Sections 108–110, 42 U.S.C. §§ 7408–10 (national ambient air quality standards ("NAAQS")—EPA has identified serious technological and legal challenges associated with a NAAQS-based approach and suggested that this is not an appropriate source of statutory authority for GHG emission regulation), Title VI, 42 U.S.C. §§ 7671–71q (stratospheric ozone protection), and Section 202, 42 U.S.C. § 7521 (mobile source emission standards—EPA's corporate average fuel economy standards for passenger vehicles were promulgated under this section). See, e.g., Advanced Notice of Proposed Rulemaking: Regulating Greenhouse Gas Emissions Under the Clean Air Act, 73 Fed. Reg. 44,354 (proposed July 30, 2008) (discussing the NAAQs-based approach at 44,477–86, Section 111 at 44,486–93, and Title VI at 44,516–20); Inimai M. Chettiar & Jason A. Schwartz, Inst. for Policy Integrity, The Road Ahead: EPA's Options and Obligations for Regulating Greenhouse Gases 71–91 (2009) (arguing for the Title VI approach as the best option for creating a cap-and-trade program under the CAA, discussing the NAAQS approach and Section 111 as inferior alternatives, and considering vehicle fuel trading under Section 211 as a supplemental approach).

[3] See, e.g., Burger et al., supra note 2, at 359–60, 363; Nathan Richardson, The Elephant in the Room or the Elephant in the Mousehole? The Legal Risks (and Promise) of Climate Policy Under § 115 of the Clean Air Act, 69 Admin. L. Rev. 291 (2017).

[4] 42 U.S.C. § 7415(a).

the same rights with respect to the prevention or control of air pollution occurring in that country as is given that country by this section."[5]

On Earth Day 2016, the United States joined the landmark Paris Climate Agreement as a signatory.[6] Like the other parties to the Paris Agreement, the United States submitted a Nationally Determined Contribution ("NDC"), which contains the United States' pledge to reduce its economy-wide GHG emissions to 26–28% below 2005 levels by 2025.[7] Commentators have argued that the Paris Agreement provides an important new basis for demonstrating that Section 115(c)'s reciprocity requirement has been met, which is necessary to trigger regulation of GHGs under Section 115.[8] On June 1, 2017, President Donald Trump announced his intention to withdraw the United States from the Paris Agreement, despite warnings from foreign officials, state and local leaders, cabinet members, industry, and other experts that this decision would harm America's interests and the world's climate.[9] However, under the Paris Agreement's withdrawal provisions, America cannot finalize its withdrawal until November 2020, the month of the

[5] Id. § 7415(c).

[6] Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, 27 U.N.T.S. 7.d [hereinafter Paris Agreement]; Paris Agreement – Status of Ratification, United Nations Framework Convention on Climate Change, http://unfccc.int/paris_agreement/items/9444.php [https://perma.cc/575C-9S63].

[7] Interim NDC Registry to the United Nations Framework Convention on Climate Change, U.S.A. First NDC Submission 1 (Mar. 9, 2016) [hereinafter U.S.A. First NDC Submission], http://www4.unfccc.int/ndcregistry/PublishedDocuments/United%20States%20of%20America%20First/U.S.A.%20First%20NDC%20Submission.pdf [https://perma.cc/YLG7-V8DR].

[8] See, e.g., Burger et al., supra note 2, at 361; Richardson, supra note 3, at 295–96; Greg Dotson & Joe Romm, How the Paris Climate Agreement Super-Charges the Clean Air Act, Think Progress (Jan. 14, 2016, 9:55 PM), https://thinkprogress.org/how-the-paris-climate-agreement-super-charges-the-clean-air-act-d7220e399833#.xe95w8m4p [https://perma.cc/72JB-DR8J]; Brian Potts, Obama's Hidden Climate Leverage, Politico: The Agenda (Feb. 1, 2016, 5:34 AM), http://www.politico.com/agenda/agenda/story/paris-climate-deal-epa-obama-000034 [https://perma.cc/VD24-BN2R].

[9] See Michael D. Shear, Trump Will Withdraw U.S. from Paris Climate Agreement, N.Y. Times (June 1, 2017), https://www.nytimes.com/2017/06/01/climate/trump-paris-climate-agreement.html; Nadja Popovich & Tatiana Schlossberg, How Cities and States Reacted to Trump's Decision to Exit the Paris Climate Deal, N.Y. Times (June 2, 2017), https://www.nytimes.com/interactive/2017/06/02/climate/trump-paris-mayors.html.

next presidential election.[10] Thus, the impact of the Paris Agreement on future administrations' ability to regulate GHGs under Section 115 of the CAA remains uncertain.

The Clean Power Plan ("CPP") is the central piece of climate regulation promulgated by the Obama EPA. It regulates GHG emissions from the electricity generation sector, and it aims to reduce that sector's GHG emissions to 32% below 2005 levels by 2030.[11] The CPP has not yet gone into effect due to ongoing litigation over whether it is a permissible application of CAA Section 111.[12] In February 2016, the U.S. Supreme Court issued a stay of the CPP while the litigation continues.[13] The U.S. Court of Appeals for the D.C. Circuit, assembled en banc, heard oral arguments on the merits in *West Virginia v. EPA* in September 2016, and the case is currently awaiting a decision by the court.[14] Even if the CPP is upheld by the courts, EPA Administrator Scott Pruitt (who was previously involved in the lawsuits challenging the CPP) has indicated that he plans to rescind the rule.[15] Moreover, even if the CPP is ultimately implemented, it is likely insufficient to achieve the United States' pledge under the Paris Agreement.[16]

[10] Paris Agreement, supra note 6, art. 28; Kevin Liptak & Jim Acosta, Trump on Paris Accord: 'We're Getting Out,' CNN Pol. (June 2, 2017, 1:52 AM), http://www.cnn.com/2017/06/01/politics/trump-paris-climate-decision/index.html [https://perma.cc/PQ7L-VF95]; Shear, supra note 9.

[11] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,661, 64,665 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60 subpart UUUU).

[12] See Petition for Review, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Oct. 23, 2015).

[13] Richard Wolf, Supreme Court Blocks Obama's Climate Change Plan, USA Today (Feb. 9, 2016, 9:56 PM), http://www.usatoday.com/story/news/politics/2016/02/09/supreme-court-halts-obamas-emissions-rule/80085182/ [https://perma.cc/RWN2-5PX6].

[14] See En Banc Oral Argument Order, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Aug. 17, 2016).

[15] See Emily Holden, Details Emerge About Trump's Planned Rollback, E&E News: Climatewire (June 12, 2017), https://www.eenews.net/stories/1060055877 [https://perma.cc/MQ7Q-5RXS]; Arianna Skibell, Trump Outlines Deregulation Agenda, E&E News: Greenwire (July 20, 2017), https://www.eenews.net/greenwire/stories/1060057684/ [https://perma.cc/YC93-X7QW].

[16] See Maria Belenky, Climate Advisers, Achieving the U.S. 2025 Emissions Mitigation Target: January 2016 Update 4, tbl.2 (Jan. 2016); Doug Vine, Ctr. for Climate & Energy Sols., Achieving the United States' Intended Nationally Determined Contribution 2 (July 2016).

In light of the Paris Agreement's potential effects on EPA's authority to regulate GHGs under Section 115 and the potential need for regulation to replace or supplement the CPP, proponents of regulating GHGs have recently been considering Section 115 with renewed interest.[17] Section 115, which is phrased broadly as giving EPA authority to require SIP revisions sufficient to prevent or eliminate endangerment to foreign countries arising from U.S. pollution, has been celebrated for its flexibility and its potential to provide authority for efficient, multisector GHG regulation.[18] Although EPA almost certainly will not undertake new GHG regulation under the CAA during President Trump's term, research on issues related to Section 115 remains relevant to preparing strategies for regulating GHGs under future administrations. Moreover, academic understanding of the law governing international pollution will continue to become more important in an increasingly interconnected world with increasingly international environmental issues like climate change.

This Note focuses on interpreting the reciprocity requirement in Section 115(c)—the requirement that other countries give the United States "essentially the same rights" that Section 115 gives those countries—especially as it may apply to regulating GHGs under Section 115.[19] It proposes an interpretation that measures reciprocity by comparing the benefits to the United States resulting from other countries' emission reductions with the United States' costs of reducing its own emissions. The cost-benefit analysis ("CBA") –based interpretation of Section 115(c) proposed in this Note was developed to address some of the legal and policy issues associated with regulating global pollutants like GHGs under Section 115, but the interpretation can apply to conventional pollutants as well.

Part I of this Note discusses the ambiguities presented by Section 115(c) and surveys the resources available for developing an interpretation of the reciprocity requirement. Part II outlines a proposed CBA-based interpretation, explores the legal arguments for and against such an interpretation, and suggests that the interpretation may have various legal and policy advantages. Part III illustrates the CBA-based

[17] See, e.g., Richardson, supra note 3, at 295 n.19.

[18] See Burger et al., supra note 2, at 362.

[19] 42 U.S.C. § 7415(c) (2012).

measure of reciprocity by applying it to the United States' NDC under the Paris Agreement. The Paris Agreement is used as an illustration due to its special significance for demonstrating reciprocity with respect to GHGs and its importance for international climate negotiations.

I. INTERPRETING SECTION 115(C)

The text of Section 115(c) is broad and ambiguous, and admits of multiple interpretations.[20] The statute refers to the rights given to foreign countries by Section 115 but is unclear about what those rights are.[21] It requires the rights given to the United States by a foreign country to be "essentially the same" as the rights given to that country by Section 115, but it does not specify which factors are relevant to determining the degree of similarity between the two sets of rights, or how similar the rights must be in order to qualify as "essentially the same."[22] Although interest in Section 115 is growing, the literature interpreting Section 115 and applying it to GHGs is still in its nascency, and few sources have devoted much attention to interpreting Section 115(c)'s reciprocity requirement. Those that have tend to focus on whether the Paris Agreement and similar international agreements satisfy Section 115(c), without fully developing an underlying interpretation of reciprocity that can apply across a range of cases.[23] This Part surveys the statutory text, legislative history, past administrative and judicial interpretations, and secondary sources that might help develop a broadly applicable interpretation of Section 115(c).

[20] See Burger et al., supra note 2, at 375 ("The phrasing in [Section 115(c)] provides significant interpretive latitude to EPA."); Bennett A. Caplan, Note, The Applicability of Clean Air Act Section 115 to Canada's Transboundary Acid Precipitation Problem, 11 B.C. Envtl. Aff. L. Rev. 539, 569 (1984) ("Use of section 115 may be difficult since it is ambiguously written and has never been interpreted by a court."); id. at 583 ("The legislative history of section 115 is unclear, however, as to the extent of reciprocity that is required to satisfy this requirement."); Richardson, supra note 3, at 310 (describing Section 115 as "skeletal").

[21] 42 U.S.C § 7415(c).

[22] Id.

[23] The most thorough discussions of Section 115(c) appear in Burger et al., supra note 2, at 375–97, and Richardson, supra note 3, at 310–12, which both approach the reciprocity requirement with an eye to determining whether a legal challenge to a reciprocity finding based on the Paris Agreement or another existing agreement would succeed in court.

First, note that the reciprocity requirement in Section 115(c) necessarily influences the content of the rights given to other countries by Section 115. In order for the United States to give any right to a foreign country under Section 115, that country must satisfy the reciprocity requirement. In other words, the rights given by Section 115 are *conditional* on the satisfaction of the reciprocity requirement, so it is impossible to define one without defining the other. An analogy may be drawn to the national treatment and most favored nation principles of international trade that are fundamental to World Trade Organization agreements.[24] The national treatment principle requires a country to apply the same economic restrictions to foreign products, services, and items of intellectual property as it applies to domestic products, services, and items of intellectual property once they have entered the market.[25] If a country provides a trade benefit to another country, the most favored nation principle requires it to provide the same trade benefit to every other country to whom it has granted most favored nation status.[26] The specific requirements that these principles place on a country are conditioned on that country's treatment of domestic products and each country with most favored nation status. Moreover, countries agree to abide by these principles in reciprocal trade agreements, and countries who violate the principles may be subject to retaliatory tariffs and sanctions that have the equivalent effect of the violation.[27] Thus, the rights given by one country to another in trade agreements are conditioned on reciprocal treatment, and the sanctions available in cases of violations—the diminutions in the rights provided to the violating country—are conditioned on the extent of the harm caused by the violation. Similarly, as a result of Section 115(c)'s reciprocity requirement, the rights given to a country by Section 115 are conditioned on a determination that the country is giving the United States essentially the same rights in return.

[24] Principles of the Trading System, World Trade Org., https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact2_e.htm [https://perma.cc/AE65-F6ZP] (last visited Aug. 24, 2017).

[25] Id.

[26] Id.

[27] The Process—Stages in a Typical WTO Dispute Settlement Case, World Trade Org., https://www.wto.org/english/tratop_e/dispu_e/disp_settlement_cbt_e/c6s10p1_e.htm [https://perma.cc/E6VP-S52B] (last visited Aug. 24, 2017).

One of the earliest and most thoroughly developed interpretations of Section 115(c) appears in a pair of letters sent from EPA Administrator Douglas Costle to Secretary of State Edmund Muskie and Senator George Mitchell in January 1981.[28] The letters discuss the possibility of using Section 115 to regulate emissions of sulfur oxides ("SO_x") and nitrogen oxides ("NO_x"), which were contributing to acid rain in the United States and Canada.[29] Administrator Costle concluded that U.S. emissions were contributing to acid rain that was endangering public welfare in Canada and that recently enacted Canadian legislation provided the Canadian Government with "ample authority to give the United States essentially the same rights as Section 115."[30]

Costle interpreted the reciprocity determination as necessarily being a two-step inquiry. First, EPA must determine whether the foreign country has the authority to give the United States essentially the same rights.[31] Second, EPA must determine whether the foreign country "is exercising or interpreting that authority in a manner that provides essentially the same rights to the United States."[32] Costle noted that "it is not possible to make a permanently binding determination that Canada has given the United States essentially the same rights based simply on a review of Canadian authorizing legislation," because the second step of the reciprocity determination "is necessarily a dynamic one which will continue to be influenced by Canadian action now and in the future."[33] Costle concluded that the first step of the reciprocity determination was satisfied by the Canadian legislation, and that this was "adequate to warrant the initiation of a Section 115 based plan revision process in appropriate States," but emphasized that, "during such a process and at the time of any final action," Canada's interpretation and implementation of its legislation must continue to satisfy the second step of the reciprocity determination.[34] Costle's two-step framework suggests

[28] New York v. Thomas, 613 F. Supp. 1472, 1486–92 (D.D.C. 1985) (reproducing in appendices A and B Administrator Costle's letters to Secretary of State Muskie and to Senator Mitchell dated January 13, 1981).

[29] Id.

[30] Id. at 1492.

[31] Id. at 1491.

[32] Id.

[33] Id.

[34] Id. at 1492.

that, in addition to being conditional on an initial reciprocity determination, the rights given by Section 115 are subject to revocation if the reciprocity requirement ceases to be satisfied.[35]

That the reciprocity inquiry is dynamic and that it helps define the rights given by Section 115 are *features* of reciprocity. Another important question is what *type* of reciprocity is contemplated by Section 115(c). Both Costle and Michael Burger et al. have interpreted Section 115(c) as requiring some degree of formal, procedural, and substantive reciprocity.[36] Formal reciprocity considers the form that a foreign country's commitment to the United States must take.[37] Section 115(c)'s formal requirements are likely minimal.[38] Procedural reciprocity considers the procedural rights given to the United States under the instrument that commits the foreign country to extending reciprocity.[39] Burger et al. argue that "the test for procedural reciprocity should be a practical one" and note that it should be relatively easy to meet, since Section 115 gives only the minimal procedural right to attend public hearings associated with revisions of State Implementation Plans.[40]

[35] The fact that a reciprocity finding is always subject to revocation also helps alleviate concerns about making such a finding in the absence of a legally binding commitment by the reciprocating country. Since the NDCs under the Paris Agreement are not legally binding, this may have important implications for a reciprocity finding made on the basis of the Paris Agreement. Michael Burger et al. suggest that EPA could overcome challenges to a reciprocity determination which focus on the nonbinding nature of the NDCs by reserving the right to withdraw its reciprocity determination if other countries fail to meet their NDC targets. Burger et al., supra note 2, at 393 (discussing Costle's two-step framework and applying it to NDCs).

[36] See *Thomas*, 613 F. Supp. at 1488 (comparing Section 115 to Canadian legislation on formal, procedural, and substantive grounds); Burger et al., supra note 2, at 375–76.

[37] See Burger et al., supra note 2, at 375.

[38] Id. at 377–78 (arguing that reciprocity could be satisfied through a global treaty or multilateral political commitment, a bilateral legal or political commitment, or domestic legislation or regulation in foreign countries).

[39] See id. at 378–80.

[40] Id. (noting Costle's conclusion that "Canada did not have to follow 'the detailed procedural . . . requirements applicable to the State plan revision process under the U.S. Clean Air Act' because '[t]he Canadian requirement for federal consultation and efforts to procure provincial action fills the same role as the State plan revision process in the U.S. system.'" (alteration in original) (citing *Thomas*, 613 F. Supp. at 1488)).

Substantive reciprocity is the central element of the reciprocity requirement.[41] This is because "[w]ithout substantive action by the foreign country, the United States would not receive the 'reciprocal benefit' envisioned by Congress when it enacted the international air pollution provision," which is the driving purpose behind the reciprocity requirement.[42] Moreover, the phrase "essentially the same rights" suggests that Section 115(c) was intended to express a practical requirement, with a focus on substance over formalistic or procedural minutia.[43] Substantive reciprocity is also the most difficult element to measure and achieve in the context of global pollutants like GHGs, where it is hard to tell when the United States is receiving "reciprocal benefits" from specific countries, and it is hard to see how any single country could provide sufficient substantive reciprocity to justify a reciprocity finding.

The interpretation proposed in this Note is a way of measuring substantive reciprocity. It was developed in part to address the challenges associated with measuring substantive reciprocity in the GHG context, although it can be applied to conventional pollutants as well. It is largely agnostic about issues of formal and procedural reciprocity, but it can be supplemented with formal and procedural requirements as necessary. The next Part develops an interpretation of substantive reciprocity that is dynamic (as contemplated by Costle) and that helps define the extent of the rights given by Section 115.

II. A COST-BENEFIT ANALYSIS–BASED MEASURE OF RECIPROCITY

This Part proposes an interpretation of Section 115(c)'s reciprocity requirement that is based on a domestic cost-benefit analysis. It then

[41] However, as Hannah Chang has noted, it is likely not a sufficient condition of reciprocity under Section 115(c). Hannah Chang, Cap and Trade Under the Clean Air Act?: Rethinking § 115, 40 Envtl. L. Rep. 10,894, 10,902 (2010) (noting that something more than "'substantive' reciprocity, which would merely ask whether the foreign country provides for GHG mitigation to the same degree as the United States," is likely necessary).

[42] Burger et al., supra note 2, at 387.

[43] This is supported by the fact that "essentially" is commonly used as a synonym for "substantially." The broad sweep of the phrase "essentially the same rights" and the lack of additional guidance to clarify this phrase's meaning also suggest that the determination was meant to be a practical one, based on circumstances involving foreign laws and international agreements that Congress could not have anticipated.

explores the legal arguments for and against such an interpretation and suggests that a CBA-based interpretation may have certain legal and policy advantages that could strengthen the case for regulating GHG emissions under Section 115.

A. Outline of the Interpretation

In broad strokes, the CBA-based interpretation of Section 115(c) defines reciprocity as a commitment by a foreign country (or group of countries) to reduce its emissions of a pollutant by an amount that would result in benefits to the United States which outweigh the United States' costs of reducing its own emissions. Thus, an international agreement to reduce emissions of a pollutant (such as the Paris Agreement) satisfies the reciprocity requirement if that agreement would result in a net benefit to the United States, taking into account the total cost to the United States of meeting its emission reduction commitments and the total benefit to the United States of the aggregate emission reductions from all parties to the agreement. The basic intuition motivating this approach is that the right given by Section 115 is the right to mutual emission reductions, up to the point where those reductions are no longer mutually beneficial.

This is only a rough sketch, not a complete interpretation of Section 115(c). First, it speaks only to the substantive component of reciprocity, so in practice it would need to be supplemented by procedural and formal requirements.[44] Second, the basic idea underlying the CBA-based interpretation—considering domestic costs and benefits when making reciprocity determinations—can be applied in a variety of ways other than through a strict cost-benefit analysis. This gives EPA flexibility in deciding how to modify and apply the CBA-based interpretation. For example, EPA could make its reciprocity determination on the basis of CBA alone, or in combination with other factors. EPA could also apply one of several variations on CBA that require different ratios of benefits to costs, such as a "wholly disproportionate" standard or a "significantly greater than" standard.[45] This Note focuses on a standard that requires benefits to outweigh costs because it illustrates the general approach

[44] See supra notes 36–43 and accompanying text.

[45] See generally Entergy Corp. v. Riverkeeper, Inc., 556 U.S. 208, 225 (2009) (discussing the various standards).

well, and because certain advantages and challenges of the approach apply uniquely to this standard. Finally, the outline of the CBA-based interpretation presented in this Note leaves certain details to be answered in the context of specific applications, such as when benefits must accrue to the United States to count toward meeting the reciprocity requirement, how to determine the business-as-usual ("BAU") baseline relative to which foreign countries' emission reductions can be measured, and whether the reciprocity determination should consider all expected costs of meeting the United States' emission reduction commitment under an international agreement or only the fraction of those costs attributable to regulation under Section 115.

One potential challenge for the CBA-based interpretation is that it may limit EPA's ability to make reciprocity determinations in cases where a foreign country does not emit a particular pollutant of concern or does not engage in a particular emitting activity, but promises not to emit in the future or promises to take certain abatement measures if it develops a particular polluting industry. In such cases, EPA could treat the value of the country's promise like that of an insurance policy, estimating the benefits that the United States derives from the promise based on the likelihood that the country will develop the industry or face an incentive to begin polluting.[46] Similarly, if a country has implemented an emissions-abating policy, but has not done so in the context of an agreement with the United States, EPA could still determine the benefit that the United States derives from the existence of that policy and make its CBA-based reciprocity determination accordingly.[47]

Perhaps the strongest objection to the CBA-based interpretation is that it is arguably more stringent than what the text of Section 115(c) actually requires. Section 115(c) makes no mention of costs, and

[46] The reverse is also true—the United States could estimate the "cost" of its own promise to avoid future polluting activities based on the likelihood that it would find itself facing an incentive to break that promise and the expected cost of keeping its promise should such a situation arise.

[47] However, determining when it is appropriate to count such policies toward a reciprocity finding for regulation of a potentially unrelated pollutant under Section 115 is a thorny issue. It is a variation on the familiar additionality problem. For a discussion of this problem, see Michael Gillenwater, Greenhouse Gas Mgmt. Inst., What is Additionality? Part 1: A Long Standing Problem 1 (Jan. 2012), http://ghginstitute.org/wp-content/uploads/2015/04/AdditionalityPaper_Part-1ver3FINAL.pdf [https://perma.cc/KC6F-LKV7].

imposes only the seemingly flexible requirement that a foreign country provide "essentially the same rights" as are given by Section 115. This Note attempts to address this objection in two ways. First, Subsection II.B.2 argues that the rights given by Section 115 can plausibly be interpreted as rights to mutually beneficial emission reductions and that this interpretation is consistent with the CBA-based understanding of reciprocity. Second, this Note suggests that the CBA-based interpretation has certain legal and policy advantages that may outweigh any apparent tension with a straightforward reading of Section 115(c)'s text. The CBA-based interpretation has the interpretive advantages of being consistent with the general trend in administrative law toward requiring consideration of costs, and of potentially avoiding challenges based on the major questions doctrine. This second advantage is a direct consequence of the fact that the CBA-based interpretation limits the range of GHG regulations available under Section 115 more than alternative interpretations of reciprocity. The CBA-based interpretation may also avoid reliance on ancillary benefits and justify climate regulation in terms of U.S. interests, which may help strengthen the case for climate regulation among conservative stakeholders.

Thus, even if EPA ultimately adopts a more permissive interpretation of the reciprocity requirement, the CBA-based interpretation is still valuable for developing our understanding of Section 115 (Section II.B), exploring ways of regulating GHGs under Section 115 without running afoul of the major questions doctrine (Subsection II.C.1), developing a rational strategy for international environmental and economic negotiations with potential applications outside Section 115 (Subsection II.C.3), and demonstrating that measures like participation in the Paris Agreement are permitted by even a narrow interpretation of Section 115(c) and may be cost justified even when only domestic climate benefits are considered (Subsection II.C.2 and Part III).

B. Legal Arguments For and Against a CBA-Based Interpretation

This Section argues that the CBA-based interpretation is supported by the general trend toward greater consideration of costs and benefits in administrative law, and that it is consistent with the text and legislative history of Section 115, especially when Section 115 is applied to global pollutants like GHGs.

1. CBA in Administrative Law Generally

As has been noted by prominent scholars, CBA has steadily been assuming an increasingly central role in government regulation over the last several decades.[48] Since the early 1980s, a series of executive orders, acts of legislation, agency rules, and judicial opinions have created various requirements that agencies must consider costs when issuing regulations.[49] For example, under President Barack Obama's Executive Order 13,563 (which reaffirms President Bill Clinton's Executive Order 12,866), any time an agency proposes a major regulation it must submit a CBA to the Office of Information and Regulatory Affairs ("OIRA") showing that the regulation's benefits justify its costs.[50] Professor Cass Sunstein has argued that these measures promoting greater use of CBA in regulation are part of a broader paradigm shift toward what he calls the "cost-benefit state."[51] The shift toward a cost-benefit state has impacted judicial interpretations of statutes,[52] and this impact has been especially evident in several major environmental cases.[53]

[48] See generally Richard L. Revesz & Michael A. Livermore, Retaking Rationality: How Cost-Benefit Analysis Can Better Protect the Environment and Our Health 9–13 (2008) ("The debate over weighing the costs and benefits of regulation—dubbed *cost-benefit analysis*—has played an important role in shaping regulatory policy for the past quarter-century."); Cass R. Sunstein, The Cost-Benefit State: The Future of Regulatory Protection ix (2002) ("Gradually, and in fits and starts, American government is becoming a cost-benefit state."). But see Amy Sinden, A "Cost-Benefit State"? Reports of Its Birth Have Been Greatly Exaggerated, 46 Envtl. L. Rep. 10,933, 10,933 (2016).

[49] See Sunstein, supra note 48, at 10–16 (outlining government measures promoting consideration of costs beginning in 1981 with President Ronald Reagan's Executive Order 12,291).

[50] Exec. Order No. 13,563 § 1(b), 3 C.F.R. 215 (2011), *reprinted in* 5 U.S.C. § 601 (2012); Exec. Order No. 12,866 §§ 1(b)(6), 6(a)(3)(C), 3 C.F.R. 638 (1993), *reprinted as amended in* 5 U.S.C. § 601.

[51] Sunstein, supra note 48, at ix; Cass R. Sunstein, Thanks, Justice Scalia, for the Cost-Benefit State, Bloomberg View (July 7, 2015, 9:00 AM) [hereinafter Sunstein, Justice Scalia], http://origin-www.bloombergview.com/articles/2015-07-07/thanks-justice-scalia-for-the-cost-benefit-state [https://perma.cc/PM5F-MXBK].

[52] See, e.g., Cass R. Sunstein, Cost-Benefit Analysis and Arbitrariness Review 10–14 (Apr. 22, 2016) (unpublished manuscript) https://ssrn.com/abstract=2752068 [https://perma.cc/8T4R-YGZ4] (discussing cases where courts have scrutinized agency failure to engage in CBA).

[53] See, e.g., Michigan v. EPA, 135 S. Ct. 2699, 2712 (2015) (holding that "appropriate and necessary" as used in the CAA's hazardous air pollutants program requires consideration of

The recent Supreme Court decision in *Michigan v. EPA* illustrates the shift toward a judicial presumption that environmental statutes require agencies to consider costs even when the statutes make no explicit reference to costs.[54] In his majority opinion, Justice Scalia stated that "[a]gencies have long treated cost as a centrally relevant factor when deciding whether to regulate" and that "[a]gainst the backdrop of this established administrative practice, it is unreasonable to read an instruction to an administrative agency to determine whether 'regulation is appropriate and necessary' as an invitation to ignore cost."[55] The Court in *Michigan v. EPA* also clarified that its earlier decision in *Whitman v. American Trucking Ass'ns*, which forbade EPA from considering costs while setting National Ambient Air Quality Standards, had the narrow holding that "where the Clean Air Act expressly directs EPA to regulate on the basis of a factor that on its face does not include cost, the Act normally should not be read as implicitly allowing the Agency to consider cost anyway."[56] Where a statute uses broad terms like "appropriate" that can encompass consideration of multiple relevant factors, the Court appears to apply a presumption that costs must be considered.[57]

Justice Kagan, writing for the dissent, agreed with the majority that EPA had to consider costs before regulating. She recognized that "[c]ost is almost always a relevant—and usually, a highly important—factor in regulation," and concluded that unless Congress provides otherwise, "an agency must take costs into account in some manner before imposing

costs); EPA v. EME Homer City Generation, 134 S. Ct. 1584, 1606–07 (2014) (holding that the CAA's Good Neighbor Provision does not preclude consideration of costs); Michigan v. EPA, 213 F.3d 663, 679 (D.C. Cir. 2000) (same); Entergy Corp. v. Riverkeeper, Inc., 556 U.S. 208, 226 (2009) (holding that EPA may rely on CBA when regulating under Section 316(b) of the Clean Water Act); see also Richard L. Revesz, Toward a More Rational Environmental Policy, 39 Harv. Envtl. L. Rev. 93, 93 (2015) ("During this past Term, the Supreme Court of the United States decided two significant cases [*EME Homer* and *UARG*], both interpreting the Clean Air Act, which together should be seen as producing a significant move toward rationality in environmental policy."); Sunstein, Justice Scalia, supra note 51 (commenting on CBA and the Supreme Court's decision in *Michigan v. EPA*).

[54] 135 S. Ct. at 2707.

[55] Id. at 2707–08.

[56] Id. at 2709.

[57] Id. at 2708–09.

significant regulatory burdens."[58] The dissent departed from the majority opinion only in maintaining that, under the CAA's regulatory scheme, EPA would have ample opportunities to consider costs throughout the process of designing and implementing regulations governing emissions of hazardous air pollutants from power plants, and that EPA knew this at the time it determined that such regulation was appropriate and necessary.[59]

In two other recent cases, *EPA v. EME Homer City Generation*[60] and *Entergy Corp. v. Riverkeeper, Inc.*,[61] the Supreme Court upheld EPA's consideration of costs where the relevant statutory text made no mention of costs. In his partial concurrence in *Entergy*, Justice Breyer expressed his view that considering costs is particularly important "in an age of limited resources available to deal with grave environmental problems, where too much wasteful expenditure devoted to one problem may well mean considerably fewer resources available to deal effectively with other (perhaps more serious) problems."[62] He noted also that a total prohibition of cost-benefit comparisons "would be difficult to enforce, for every real choice requires a decisionmaker to weigh advantages against disadvantages, and disadvantages can be seen in terms of (often quantifiable) costs."[63] He concluded that EPA was authorized to compare costs and benefits even where legislative history made it clear that the statute's sponsors intended EPA to minimize its use of CBA.[64]

[58] Id. at 2716–17 (Kagan, J., dissenting). Note, however, that both the majority and the dissent in *Michigan v. EPA* emphasize that the presumption in favor of considering costs "does not require an agency to conduct a formal cost-benefit analysis of every administrative action." Id. at 2717; see also Sinden, supra note 48, at 10,934 (arguing that this cuts against the theory of a cost-benefit state).

[59] *Michigan v. EPA*, 135 S. Ct. at 2726 (Kagan, J., dissenting).

[60] 134 S. Ct. 1584, 1606–07 (2014).

[61] 556 U.S. 208, 226 (2009).

[62] Id. at 233 (Breyer, J., concurring in part and dissenting in part); see also Paul N. Singarella & Marc T. Campopiano, The Role of Economics in Environmental, Health, and Safety Regulation After *Entergy*, 35 Environs: Envtl. L. & Pol'y J. 101, 101–02 (2011) (discussing Justice Breyer's concerns about agency "tunnel vision" and arguing that his concurrence in *Entergy* "represents an important shift towards a regulatory and judicial acceptance of economics as a commonsense tool to prevent unreasonable regulatory outcomes").

[63] *Entergy*, 556 U.S. at 232 (Breyer, J., concurring in part and dissenting in part).

[64] Id. at 230–33.

A CBA-based interpretation of reciprocity in Section 115(c) is likely supported by the modern judicial trend toward presuming that environmental statutes require (or at least permit) agencies to compare costs and benefits. *EME Homer* and *Entergy* suggest that a court is unlikely to forbid EPA from considering costs and benefits when making its reciprocity determination. Under the holding of *Michigan v. EPA*, the agency may be *required* to consider costs when deciding whether to regulate GHGs under Section 115, since the statute does not expressly provide otherwise. Moreover, Section 115(c)'s use of the broad phrase "essentially the same rights" suggests consideration of multiple factors, so a reviewing court may, following *Michigan v. EPA*, consider cost to be one of these factors.[65] Even on the *Michigan v. EPA* dissent's reasoning, EPA may be required to consider costs when making its initial reciprocity finding because it is not entirely clear what regulatory process is triggered by an initial determination under Section 115 or how that process might require EPA to consider costs.[66] Furthermore, EPA has never regulated emissions of any pollutant under Section 115, and therefore does not have a body of experience ensuring that it will consider costs throughout the regulatory process, as it did in *Michigan v. EPA*.[67] By satisfying any potential requirement to consider costs at the outset, a CBA-based interpretation of reciprocity may help strengthen the legal case for using Section 115 to regulate GHGs.

2. CBA and the Specific Provisions of Section 115

This Subsection considers whether a CBA-based interpretation is consistent with the specific provisions of Section 115. A CBA-based interpretation accords well with the goal of ensuring that other countries provide "reciprocal benefits for U.S. citizens," which is evident in the legislative history of Section 115.[68] This concept of reciprocal benefits is consistent with the basic idea underlying the CBA-based

[65] See *Michigan v. EPA*, 135 S. Ct. at 2708–09.

[66] See id. at 2726 (Kagan, J., dissenting).

[67] Id.

[68] S. Rep. No. 89-192, at 6 (1965); see also Burger et al., supra note 2, at 376–77 (discussing this legislative history); supra notes 41–43 and accompanying text. Since the text of Section 115(c) is ambiguous as to how reciprocity should be measured, courts may rely significantly on this legislative history in interpreting the reciprocity requirement.

interpretation—namely, that Section 115 provides the right to mutual emission reductions that are mutually beneficial. When the purpose of the reciprocity requirement is expressed in terms of reciprocal benefits, it is natural to measure reciprocity in terms of net benefits and costs. Burger et al. have also endorsed using the concept of reciprocal benefits to measure reciprocity, stating that "[t]his concept of 'reciprocal benefits,' . . . can provide EPA a touchstone to evaluate the number of countries needed to justify a reciprocity determination" in the case of GHG emissions.[69]

One possible objection is that even if it is correct to describe the rights given by Section 115 in terms of reciprocal benefits, the CBA-based interpretation misconstrues those rights. The text of Section 115 suggests that it gives other countries the right to an amount of abatement that is adequate to "prevent or eliminate the endangerment" caused in that country by U.S. emissions, not the right to the amount of abatement that the United States can provide while maintaining a net economic benefit.[70] Recall, however, that the rights given by Section 115 are necessarily conditional (because the reciprocity requirement and the rights-giving provisions are inextricably linked), and the United States' determination to continue providing benefits to a foreign country is conditional on that country's continued satisfaction of the reciprocity requirement, so there is nothing inherently inconsistent with the statutory text about interpreting Section 115 as providing an amount of abatement that is conditional on a CBA.[71] Of course, this could be argued to show only that the right to prevention or elimination of the

[69] Burger et al., supra note 2, at 376. Although Burger et al.'s suggestion that reciprocal benefits should play a role in measuring reciprocity is consistent with a CBA-based interpretation of reciprocity, they do not develop a CBA-based interpretation. Instead, they note that reciprocal arrangements with an appropriate number of nations "would provide the U.S. with benefits comparable to those that the U.S. would be providing to the other nations." Id. at 377. This approach would compare the benefits that the United States receives from other countries' abatement with the benefits given to other countries by the United States, rather than with the cost to the United States of providing those benefits. Burger et al.'s approach could lead the United States to act irrationally, since it would find the reciprocity requirement satisfied in a case where the United States received benefits from other countries equal to the benefits it provided to those countries, but where providing those foreign benefits costs the United States far more than the value of the benefits it received from other countries.

[70] 42 U.S.C. § 7415(b) (2012).

[71] See supra Part I.

endangerment is conditional on foreign countries providing the same right, not that a CBA showing a net benefit should be the condition used to measure reciprocity. However, a right to prevention or elimination of an endangerment is far from self defining,[72] and the CBA-based interpretation provides a workable standard that defines that right in terms of reciprocal benefits and accounts for the inherent conditionality of rights given by Section 115. Moreover, agencies are generally prohibited from undertaking regulation—even regulation to protect foreign or domestic rights—without considering costs,[73] so any definition of prevention or elimination of an endangerment caused in foreign countries will need to be constrained by some mechanism that accounts for the costs of doing so.[74]

The need for a workable standard defining the relationship between the reciprocity requirement and the rights given by Section 115 is especially evident in the context of global pollutants like GHGs. It is clear that the United States could not unilaterally prevent or eliminate the endangerment to health and welfare in foreign countries caused by

[72] The difficulty of defining a country's obligation to prevent or eliminate international pollution is analogous to the difficulty highlighted by litigation over states' obligations not to "contribute significantly" to nonattainment of NAAQS in downwind states under the CAA's Good Neighbor Provision. See, e.g., Air Pollution Control Dist. of Jefferson Cty. v. EPA, 739 F.2d 1071, 1074–75 (6th Cir. 1984); Revesz, supra note 53, at 95–98 (describing the decades-long saga to control regional pollution culminating in *EME Homer*).

[73] See supra Subsection II.B.1.

[74] One way to account for costs is to incorporate a CBA into the definition of "prevent or eliminate" rather than into the reciprocity requirement. Such an approach could incorporate many of the features of the CBA-based interpretation of reciprocity advanced in this Note and may capture many of its advantages. Another approach is to consider costs through standard procedures for economic review of agency actions, such as OIRA review, rather than explicitly incorporating cost considerations into the interpretation of any statutory term. This Note considers costs through the reciprocity requirement, rather than taking one of these alternative approaches, because comparing domestic costs with the benefits received from other countries arguably fits more naturally into the reciprocity requirement than into a definition of "prevent or eliminate," and because the new reciprocity-based framework for applying CBA developed in this Note may provide certain legal and policy advantages that could make this framework useful even if it is incorporated into an alternative method of considering costs. See infra Section II.C. Moreover, by applying a domestic CBA only in the context of 115(c) determinations, EPA can make it clear that it is only using a domestic CBA to determine whether reciprocity exists, while still promoting reciprocity by using a global CBA in all other contexts. See infra note 109.

climate change, even if it eliminated its GHG emissions overnight.[75] But the United States still might prevent or eliminate the fraction of the endangerment that is caused by its own emissions. The question then becomes: how much must the United States reduce its emissions to satisfy its obligation to prevent or eliminate its contribution to the foreign endangerment, and how will the reciprocity requirement and the need to consider costs affect this determination?

As a starting point, it seems clear that the United States is not obligated to undertake extreme emission reductions at great expense if it will receive only de minimis benefits from foreign countries. This would run contrary to the reciprocity requirement, the goal of achieving reciprocal benefits, Section 115(c)'s emphasis on practical effects over formal and technical measures of reciprocity, and the general presumption that agencies may not "impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits."[76] Thus, Burger et al.'s suggestion that a single nation, "even a small island nation facing the threat of vanishing under sea level rise," could satisfy the reciprocity requirement is probably incorrect, because a single small island nation's emission reductions would probably result in only de minimis benefits to the United States, even if those reductions represented a significant portion of the nation's total emissions.[77]

EPA could interpret Section 115(c) to require that a foreign country (or group of countries) commit to a "substantial" amount of emission reductions, or an amount on par with the United States' total reductions, or perhaps an amount that represents a similar percentage of its total emissions or that requires a similar level of effort to achieve.[78] But there is no inherent guarantee that this would prevent the United States from undertaking great expense only to receive de minimis benefits. Climate

[75] See Burger et al., supra note 2, at 399. This was also true in the case of acid rain in Canada—Administrator Costle concluded that "emission sources in both the U.S. and Canada contribute to the problem," so Canada would have continued experiencing acid rain even if the United States eliminated its emissions. New York. v. Thomas, 613 F. Supp. 1472, 1490 (D.D.C. 1985).

[76] *Michigan v. EPA*, 135 S. Ct. at 2701.

[77] Burger et al., supra note 2, at 376.

[78] Burger et al. have suggested an approach that considers several of these factors. See id. at 389 ("It would be eminently reasonable for EPA to look to the relative commitments of each country measured from a variety of perspectives and to take into account differences in national circumstances in determining whether they are making comparable efforts.").

change is, after all, a global collective action problem involving great uncertainty, and the payoff structure may be such that even substantial reductions or reductions comparable to those of the United States would not result in appreciable domestic benefits.[79] To be sure, the global benefit of the emission reductions in this scenario may be far greater than de minimis, and this may be sufficient to satisfy the general presumption against expensive regulations that achieve only de minimis benefits. But the presence of the reciprocity requirement suggests that some attention to U.S.-specific benefits is required. One way of accounting for benefits to the United States is to interpret the reciprocity requirement as being satisfied as long as a country or group of countries commits to reductions that result in a *substantial benefit to the United States*, even if the United States ends up incurring costs that are greater than the benefits it receives.

The question remains, though, how much abatement Section 115 gives foreign countries a right to, once the reciprocal benefits accruing to the United States are substantial enough to satisfy the reciprocity requirement. One possibility is to let EPA answer this question on a case-by-case basis, based on the statutory guidance to "prevent or eliminate" the foreign endangerment and its discretion and expertise regarding an appropriate amount of emission reductions.[80] This is likely a reasonable interpretation that could withstand legal challenge, especially if the reviewing court applies *Chevron*[81] deference. However, as discussed below, courts might view this interpretation as allowing EPA too much discretion regarding the extent to which Section 115 enables it to regulate GHG emissions.[82]

An alternative approach is to apply the reciprocity requirement not only in deciding *whether* Section 115 authorizes the United States to abate its emissions, but also in deciding *how much* to abate. On this approach, the United States must receive benefits that are equal to (or at least not significantly less than) the costs of meeting its emission reduction commitments, and the benefits needed to justify an abatement

[79] One advantage of the CBA-based interpretation is that it avoids this outcome by explicitly building consideration of U.S. benefits into the reciprocity determination.

[80] This is the approach suggested in Burger et al., supra note 2, at 399–400.

[81] Chevron, U.S.A. v. Nat. Res. Def. Council, 467 U.S. 837 (1984).

[82] See infra Subsection II.C.1.

measure will vary depending on the costs of that measure. This is, in essence, the CBA-based interpretation of reciprocity. Put this way, the CBA-based interpretation appears to be a reasonably natural extension of Administrator Costle's observation that the reciprocity determination is necessarily dynamic. On Costle's framework, as time goes on EPA must continually ensure that reciprocity is still being substantively satisfied.[83] Similarly, on the CBA-based interpretation, as the United States commits to greater and greater degrees of abatement it must ensure that the reciprocity requirement (which requires consideration of domestic costs and benefits) is still satisfied with respect to each unit of abatement it pledges.

This Section has shown that there is some legal support for the CBA-based interpretation. This support may be strong enough to defend the CBA-based interpretation against a legal challenge, especially if a reviewing court applies the deferential *Chevron* standard.[84] However, there is certainly room for reasonable minds to differ on this question. This Section has aimed only to show that there is a plausible legal basis for the CBA-based interpretation, not that it is guaranteed to succeed in court or that it is the only reasonable interpretation of Section 115(c). The next Section suggests that the CBA-based interpretation may have some legal and policy benefits that could make it preferable to alternative interpretations of Section 115(c).

C. Potential Legal and Policy Advantages of a CBA-Based Interpretation

This Section suggests three potential advantages to a CBA-based interpretation of reciprocity. First, it may help avert challenges to regulation of GHGs under Section 115 based on the major questions doctrine by providing a limiting principle on EPA's regulatory authority under that section. Second, it may provide a basis for showing that the domestic climate benefits associated with regulation of GHGs under Section 115 outweigh the costs, without relying on controversial ancillary benefits or foreign climate benefits. Third, it may represent a

[83] See supra notes 28–35 and accompanying text.

[84] Burger et al. have argued that this is likely. See Burger et al., supra note 2, at 378.

rational strategy for approaching international climate negotiations that could lead to a Pareto optimal outcome if adopted by all countries.

1. Avoiding Challenges Under the Major Questions Doctrine

A CBA-based interpretation of reciprocity may help avert challenges to regulation of GHGs under Section 115 based on the major questions doctrine and what Professor Nathan Richardson has described as the "elephants in mouseholes" principle.[85] The basic idea behind both of these arguments is that agencies should not be permitted to interpret vague, obscure, or narrowly applicable statutory provisions to greatly expand or alter their regulatory authority, especially in areas of great economic and political significance. Both arguments could cause a court to reject an interpretation of Section 115 that would allow EPA to regulate GHGs, even if EPA's interpretation would otherwise receive *Chevron* deference.[86] A CBA-based interpretation of reciprocity may provide enough of a limiting principle on the expansion of EPA's regulatory authority under Section 115 to avoid major questions and elephants in mouseholes challenges—that is, it may shrink the elephant of regulating GHGs enough to fit within the Section 115 mousehole.

Normally, under *Chevron*, courts defer to agency interpretations of ambiguous statutes they administer as long as those interpretations are reasonable.[87] Under the major questions doctrine, *Chevron* deference does not apply in "extraordinary" cases involving questions of great economic and political significance that are central to the relevant statutory scheme.[88] The major questions doctrine applies at "Step Zero" of *Chevron*, before a court considers whether the statute is ambiguous. In cases involving questions of great political and economic significance, the reasoning goes, the usual assumption that Congress

[85] See Richardson, supra note 3, at 309–12.

[86] See id. at 312–15. The doctrine of *Chevron* deference is often formulated as a multistep test: at "Step Zero," the court determines whether it should apply the usual assumption that Congress intended to delegate agencies the authority to interpret ambiguous statutory text. At "Step One," the court determines whether the statute at issue is one that the agency administers. If so, the court moves to "Step Two" and determines whether the agency's interpretation is reasonable. If so, the court will defer to the agency interpretation.

[87] *Chevron*, 467 U.S. at 842–43.

[88] King v. Burwell, 135 S. Ct. 2480, 2488–89 (2015) (citing Util. Air Regulatory Grp. (UARG) v. EPA, 134 S. Ct. 2427, 2444 (2014)); see also Richardson, supra note 3, at 314.

intended to implicitly authorize agencies to fill in ambiguities in statutory text does not apply. An expansion of EPA's regulatory authority to cover GHG emissions from a wide variety of sources would have great political and economic significance, and therefore might trigger the major questions doctrine.[89]

The "elephants in mouseholes" principle may also cause EPA to be denied *Chevron* deference, although it operates somewhat differently and can be triggered under somewhat different circumstances. The principle may apply at either Step One or Step Two of the *Chevron* analysis. When applied at Step One, the principle operates as a canon of statutory interpretation and suggests that courts should avoid interpreting statutory text as ambiguous where a finding of ambiguity would afford agencies broad regulatory power based on "vague terms or ancillary provisions."[90] When applied at Step Two, the principle operates as a constraint on the range of agency interpretations that courts will accept as reasonable, preventing agencies from relying on ambiguous, minor, or rarely applied statutory provisions to work "enormous and transformative" expansions in their regulatory authority, even when they are afforded *Chevron* deference.[91] Whether applied at *Chevron* Step One or Step Two, the "elephants in mouseholes" principle could cause a reviewing court to reject an interpretation of Section 115 that would allow EPA to regulate GHGs. The court could find that Section 115 is vague, obscure, and infrequently used—a mousehole—and that regulation of GHG emissions from all types of sources greatly expands EPA's regulatory authority with major political and economic implications—an elephant.[92]

[89] Richardson, supra note 3, at 315.

[90] Whitman v. Am. Trucking Assn., 531 U.S. 457, 468 (2001); see Richardson, supra note 3, at 312.

[91] *UARG*, 134 S. Ct. at 2444.

[92] Richardson, supra note 3, at 314. Richardson has offered some responses to major-questions-doctrine and elephants-in-mouseholes challenges to regulating GHG emissions under Section 115. Id. at 315–19. One response is to argue that Section 115 is no mousehole at all because, rather than acting as a standalone source of authority, it invokes the extensive and detailed regulatory scheme for revising SIPs found in Section 110, which is "arguably *the* core provision" of the Clean Air Act, and which draws on states' plenary power to design and implement revisions to their SIPs. Id. at 24–25; 42 U.S.C. § 7415(b) (cross-referencing 42 U.S.C. § 7410(a)(2)(H)(ii) (CAA Section 110)). Some concern remains, however, that "*any* attempt to shoehorn climate regulation into a 1970s-vintage statute is

A CBA-based interpretation of reciprocity may help avert these challenges by providing a limiting principle on EPA's authority to regulate GHG emissions under Section 115. On a CBA-based interpretation, EPA may only require the states to revise their SIPs if the costs associated with those revisions would be offset by the domestic benefits expected from the relevant foreign countries' emissions reductions. This is a meaningful limit that could impact a court's analysis of a major questions or elephants in mouseholes challenge. To give an extreme example, Section 115 would look much more like a mousehole if it were interpreted to allow major GHG regulation based on an obligation to a single small nation that was unable to provide substantial reciprocity.[93] A CBA-based interpretation of Section 115(c) would prevent the imposition of such a major obligation on the basis of such minimal reciprocity.

A potential objection to the CBA-based interpretation is that it does not provide enough of a limitation to enable the climate elephant to enter through Section 115 and fit within the CAA's regulatory scheme. Richardson has suggested that once EPA is in the business of regulating GHG emissions on a major scale, it will have a regulatory elephant on its hands, regardless of whether its authority is limited to a single sector or extends to the whole economy.[94] If this is correct, the limitations on EPA's regulatory authority imposed by a CBA-based interpretation of reciprocity may have little or no effect on EPA's ability to defend against a major questions or elephants in mouseholes challenge. Still worse, limitations derived from EPA's own interpretation of the reciprocity requirement might appear reminiscent of EPA's Tailoring Rule, which attempted to impose limits on EPA's authority to regulate

putting an elephant in a mousehole." Richardson, supra note 3, at 318. Richardson has convincingly argued that the Section 115 mousehole is much larger than it appears, but if GHG regulation under Section 115 is to survive a challenge based on the major questions doctrine (which may apply regardless of whether the statutory provision being invoked is considered a mousehole) or the elephants in mouseholes principle, the regulatory elephant will likely need to be slimmed down as much as possible. As discussed below, the CBA-based interpretation may help achieve this.

[93] See supra text accompanying note 77. A single small nation producing minimal GHG emissions is likely unable to provide substantial reciprocity because even drastic measures to reduce that nation's emissions would likely yield only minimal benefits for the United States.

[94] Richardson, supra note 3, at 318.

GHG emissions from stationary sources, and which was struck down by the Supreme Court in *Utility Air Regulatory Group* ("*UARG*") *v. EPA*.[95] A reviewing court might reject EPA's attempt to reduce the size of the climate elephant by self-imposing limitations on its authority to regulate under Section 115 that appear nowhere in the statutory text.

However, a CBA-based interpretation of reciprocity is likely distinguishable from the Tailoring Rule, and it may have a significant effect on a court's analysis of a major questions or elephants in mouseholes challenge (although that effect is ultimately hard to predict, given the considerable uncertainty surrounding the application of these doctrines).[96] Unlike the Tailoring Rule in *UARG*, a CBA-based interpretation of reciprocity does not require EPA to rewrite unambiguous statutory text to make its authority to regulate GHGs consistent with the CAA's statutory scheme.[97] Moreover, significant climate-based regulation under the CAA has already been enacted, indicating that regulation of GHG emissions can avoid major questions issues when the regulation is appropriately limited.[98] For example, EPA has successfully implemented regulations governing GHG emissions from mobile sources through its corporate average fuel economy ("CAFE") standards, and may have helped avoid major questions challenges by limiting the scope of these regulations to light-duty vehicles.[99]

The CBA-based interpretation limits the climate regulations that can be enacted under Section 115 not by restricting the regulations to a particular sector, but by allowing only regulations that will yield a net benefit to the United States. This is a different kind of limitation than the

[95] 134 S. Ct. at 2444–45.

[96] See Nathan Richardson, Keeping Big Cases from Making Bad Law: The Resurgent "Major Questions" Doctrine, 49 Conn. L. Rev. 355, 406–09 (2016) (discussing the difficulty in determining when the major questions doctrine applies and describing this difficulty as "[p]erhaps the most fundamental problem with the major questions doctrine").

[97] *UARG*, 134 S. Ct. at 2445 ("We conclude that EPA's rewriting of the statutory thresholds was impermissible and therefore could not validate the Agency's interpretation of the triggering provisions. An agency has no power to 'tailor' legislation to bureaucratic policy goals by rewriting unambiguous statutory terms.").

[98] Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324 (May 7, 2010) (codified at 40 C.F.R. pts. 85, 86, and 600; 49 C.F.R. pts. 531, 533, 536, 537, and 538).

[99] Id.

CAFE standards' limited application to a specific sector, but it may be equally effective in avoiding major questions issues. By interpreting Section 115(c)'s reciprocity requirement as a significant limitation on the manner in which and the extent to which EPA may regulate GHGs, it shows that Section 115 is not being interpreted to greatly alter or expand EPA's regulatory authority under the CAA. Many, perhaps most, of the limitations on GHG emissions that a CBA-based interpretation would allow under Section 115 could already be imposed through regulation under other provisions like Section 202 (mobile sources) or Section 111(b) and (d) (standards of performance for new and existing stationary sources).[100] On the CBA-based interpretation, Section 115 authorizes EPA to impose emission limits that are similar to—and not wildly more expansive or expensive than—those authorized under other CAA provisions, while accounting for international effects of pollution and providing additional flexibility for emission trading between sectors.

The outcome of the pending Clean Power Plan ("CPP") litigation is likely to help clarify the major questions and elephants in mouseholes doctrines. One of the key issues in the litigation is whether EPA will receive *Chevron* deference.[101] EPA has argued that the major questions doctrine does not apply by distinguishing the CPP from *King v. Burwell* and *UARG*, largely on the grounds that its application is limited to major sources that are already regulated under the CAA.[102] If the courts accept EPA's argument that the limitations on the CPP are sufficient to render the major questions doctrine inapplicable, a similar argument may succeed in the case of regulating GHGs under Section 115 with limitations provided by the CBA-based interpretation of reciprocity.

[100] See supra note 2 for a discussion of existing and proposed GHG regulations under the CAA.

[101] Transcript of Oral Argument at 42–92, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Sept. 27, 2016) (discussing the standard of review and the applicability of the major questions doctrine).

[102] Respondent EPA's Final Brief at 40–44, West Virginia v. EPA, No. 15-1363 (D.C. Cir. Apr. 22, 2016), https://www.edf.org/sites/default/files/content/epa_final.pdf [https://perma.cc/HY5S-VKCT].

2. Showing that Climate Regulation Is Cost Justified Based on Domestic Climate Benefits

The second potential benefit of a CBA-based interpretation of reciprocity is that it could provide a way to show that the costs of significant climate regulation are outweighed by the climate benefits, without relying on ancillary benefits like reduction of other pollutants or consumer savings on electricity. Commentators have criticized the use of ancillary benefits to justify climate regulation,[103] and there is some indication that the Supreme Court might reject a CBA of climate regulation that relied on ancillary benefits.[104] Moreover, some climate measures (such as carbon capture and storage) may have little or no ancillary benefits, and therefore could be justified only on the basis of their climate benefits. Since the CBA-based interpretation of reciprocity considers only climate benefits, it avoids these controversies.

When climate benefits are considered alone, many measures aimed at reducing GHG emissions do not pass a CBA.[105] For example, Ted Gayer and Professor W. Kip Viscusi note that the National Highway Traffic Safety Administration ("NHTSA") estimated its proposed CAFE standards for passenger cars and light trucks would have a cost of $132.1 billion and estimated climate benefits of $45.6 billion.[106] EPA estimated that its similar proposed CAFE standards would have a cost of

[103] See Ted Gayer & W. Kip Viscusi, Determining the Proper Scope of Climate Change Policy Benefits in U.S. Regulatory Analyses: Domestic Versus Global Approaches, Brookings Institution, at 10–12 (Aug. 23, 2016), https://www.brookings.edu/wp-content/uploads/2016/08/rev-environ-econ-policy-2016-gayer-reep-rew002.pdf [https://perma.cc/227J-45UR] (comparing the GHG benefits of various energy regulations to total benefits and arguing that GHG benefits are often "dwarfed" by other benefits, such as financial savings to consumers); see also Revesz & Livermore, supra note 48, at 58–65 (2008) (discussing "the systematic tendency of academics and policymakers to look only at unintended risks, without also looking at unintended benefits").

[104] Compare *Michigan v. EPA*, where the Court declined to address the question whether EPA could have considered ancillary benefits when determining that regulation of mercury from power plants was appropriate and necessary but raised the topic in a tone that suggested skepticism about the validity of such considerations. 135 S. Ct. at 2711. Elsewhere, the Court noted that the costs of the regulation were far greater than its quantifiable benefits but did not mention ancillary benefits (which would have outweighed the costs). Id. at 2705–06.

[105] See Gayer & Viscusi, supra note 103, at 10–12.

[106] Id. at 17.

$192.0 billion and estimated climate benefits of $46.4 billion.[107] The benefits are even smaller if only domestic climate benefits are considered.[108] (And there is a live debate over whether it is appropriate to consider the global climate benefits of GHG emission reductions when making decisions about domestic policy.[109]) Gayer and Viscusi have noted that the CPP's expected compliance costs of $7.3 billion likely outweigh its benefits if only domestic climate benefits are considered, which are estimated at between $2.1 billion and $6.9 billion.[110]

The CBA-based interpretation of Section 115(c) has the potential to justify GHG regulation on the basis of domestic climate benefits because it accounts for the benefits coming from all countries that provide reciprocity, rather than only the benefits of U.S. reductions.[111]

[107] Id.

[108] Id.

[109] Compare Gayer & Viscusi, supra note 103 (criticizing the use of global values of the social cost of carbon ("SCC") in domestic policy), with Peter Howard & Jason Schwartz, Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon, 42 Colum. J. Envtl. L. 203 (2017) (defending the use of global SCC figures). For most applications, I support Howard and Schwartz's approach of using global SCC figures. However, I note that the CBA-based interpretation's use of a domestic SCC in reciprocity determinations may be consistent with the underlying reasoning of both approaches. It is obviously consistent with Gayer and Viscusi's approach because it uses a domestic SCC value. The main justification for using a global SCC value is that it promotes good will and reciprocity with other countries. See Howard & Schwartz, supra, at 227–32. But the purpose of Section 115(c) is to measure whether reciprocity exists in the present, and EPA can make that determination on the basis of a domestic SCC without compromising its ability to promote future reciprocity by adopting mutually beneficial climate policies. Indeed, Howard and Schwartz argue that using a global SCC promotes reciprocity by employing a tit-for-tat strategy, and this Note suggests that this is exactly the strategy that a CBA-based interpretation of reciprocity represents. Compare id., with infra Subsection II.C.3. Howard and Schwartz also argue that spillover effects make calculating a domestic SCC difficult as a practical matter. Howard & Schwartz, supra, at 207. Part III of this Note uses a domestic SCC value to perform a domestic CBA of the Paris Agreement. The uncertainty associated with the domestic SCC value substantially weakens the usefulness of this CBA's results, which supports Howard and Schwartz's argument. This uncertainty could be reduced somewhat through further research, but Howard and Schwartz are likely correct that a considerable degree of uncertainty is inevitable.

[110] Gayer & Viscusi, supra note 103, at 11–12.

[111] Note, however, that the CBA-based interpretation does not *preclude* EPA from considering ancillary benefits. If EPA deemed consideration of ancillary benefits appropriate (which is likely the correct approach, see Revesz & Livermore, supra note 48, at 58–65), it

Since climate change is a globally caused problem, the benefits to the United States due to modest abatement by a large group of countries are likely to overshadow the benefits of extreme abatement by any single country. In other words, the global problem of climate change is best answered with a global solution.

An opponent of the CBA-based interpretation might argue that EPA cannot claim credit for other countries' abatement, since the decision to regulate under Section 115 does not cause this foreign abatement. For example, the United States might withdraw from the Paris Agreement or ignore its Nationally Determined Contribution (which is, after all, not legally binding) and still enjoy the benefits of other parties' emission reductions. There are two answers to this argument. First, U.S. participation probably does have considerable influence on some countries' abatement efforts under the Paris Agreement and similar international agreements, given its power, international influence, and high present and historic GHG emissions.[112]

Second, counting the benefits due to foreign countries' emission reductions for purposes of the reciprocity determination is consistent with the purpose of Section 115. Even when measured in terms of CBA, the reciprocity determination is properly a matter of whether foreign countries are taking action to protect the United States' environmental interests, not whether the decision to regulate under Section 115 has induced that action. If they are, the United States is obligated under Section 115 to provide an appropriate amount of protection of their environmental interests because they have given the United States "essentially the same rights," regardless of their reasons for doing so.[113]

could include those benefits in addition to the climate benefits coming from all countries that provide reciprocity and weigh the total figure against the costs.

[112] See, e.g., Chris Mooney, What It Would Really Mean if Trump Pulls the U.S. Out of the Paris Climate Agreement, Wash. Post (Nov. 9, 2016), https://www.washingtonpost.com/news/energy-environment/wp/2016/11/09/what-it-would-really-mean-if-trump-pulls-the-u-s-out-of-the-paris-climate-agreement/?utm_term=.8a2698a3c96f [https://perma.cc/C8HE-9N44] ("Noticing that one fifth of its emissions cuts [which were pledged by the U.S. in the Paris Agreement] have vanished, [Andrew Jones, co-director of Climate Interactive] said, 'I think the rest of the world would be less likely to take action on their own part, and do their own share.'").

[113] Moreover, it would be difficult, impractical, and unwise for EPA to assume the role of evaluating other countries' motivations for agreeing to emission reductions and establishing standards for determining whether those motivations are acceptable.

The Senate Report accompanying the introduction of Section 115's predecessor stated "[i]t is important that we, in the interest of international amity and in fairness to the people of other countries, afford them the benefit of protective measures."[114] This focus on international amity and fairness evinces Congress's intent that, at the very least, the United States has an obligation under Section 115 not to free ride on the environmental protection provided by other countries.

Furthermore, legislative history reveals Congress's expectation that Section 115 would help the United States secure "reciprocal benefits" from other countries.[115] Congress could have selected a different mechanism for pursuing these reciprocal benefits, such as the threat of economic sanctions. Instead, it chose to offer environmental protection for countries that reciprocate. Thus, even if the idea that Section 115 induces other countries to commit to emission reductions in international agreements like the Paris Agreement is in some ways a fiction, it is a fiction contemplated by Section 115. Finally, as discussed below, the CBA-based interpretation of reciprocity may be an effective way of inducing emission reductions by other countries insofar as it is an application of a tit-for-tat strategy, which has been lauded as a highly effective strategy in collective action situations.[116]

3. Developing a Rational Strategy for International Climate Negotiations

The third potential advantage of a CBA-based interpretation is that it may represent a rational strategy for approaching international climate negotiations. If this strategy is widely adopted, it may lead to a Pareto optimal level of emission reductions by each country.

In general, CBA is considered an invaluable tool for achieving rational, efficient policy.[117] Thus, if it is applied correctly, one would expect it to help determine the efficient level of GHG emission reduction that a country should commit to in international agreements (such as the Paris Agreement) and pursue through domestic regulation

[114] S. Rep. No. 89-102, at 6 (1965).

[115] Id.

[116] Stephen J. DeCanio & Anders Fremstad, Game Theory and Climate Diplomacy, 85 Ecological Econ. 177, 181 (2013); Howard & Schwartz, supra note 109, at 227–32.

[117] See, e.g., Revesz & Livermore, supra note 48, at 12.

(such as that under Section 115). The problem with applying CBA to GHG emission reductions is that climate change is a global externality, so if each country evaluates only the domestic costs and benefits of its own climate policy, it will choose a level of abatement that is below the globally optimal level. This is because the costs of abatement are borne by the country individually, but the benefits are shared globally. However, if a country can expect other countries to reciprocate, it may have an incentive to abate up to the efficient level because its abatement induces other countries to abate their emissions as well. The country still bears the full costs of its own abatement individually, and the benefits of its abatement are still shared globally, but it also receives a portion of the shared benefit from the other countries' reductions (which its own abatement has induced).

The challenge is to get all the countries to reciprocate one another's abatement commitments. Since a country will still enjoy the benefits of other countries' abatement whether or not it abates, there is an incentive to free ride. One strategy for addressing such collective action problems that has been lauded by game theorists is tit-for-tat, in which a country essentially makes its cooperation conditional on other countries cooperating as well.[118] Thus, if a country tries to free ride, it can expect other countries to cease (or at least reduce) their abatement, and it will lose the benefits of that abatement. This is exactly the strategy represented by the CBA-based interpretation of reciprocity, which makes the United States' level of abatement conditional on the benefits it receives from other countries' abatement. If more countries pledge to reduce their emissions (or if countries pledge to reduce their emissions by a greater amount), the United States will receive a greater benefit, which will justify additional reductions under Section 115.

One advantage of the CBA-based interpretation is that it enables the United States to apply tit-for-tat on a marginal basis (at least in theory). The United States cannot credibly claim that it will make its entire abatement pledge conditional upon that of Japan. It can, however, credibly say that it will increase or decrease its abatement by an amount corresponding to the benefits it receives from Japan's abatement. The promise will be especially credible if the United States has already

[118] DeCanio & Fremstad, supra note 116, at 181; Howard & Schwartz, supra note 109, at 227–32.

committed to this tit-for-tat strategy (and signaled to Japan that it is doing so) by adopting the CBA-based interpretation of Section 115(c)'s nondiscretionary requirement to prevent or eliminate GHG emissions. Suppose that every country adopted this strategy and promised to adjust its emissions based on the benefits it derived from Japan's level of abatement. By increasing its abatement level, Japan would give a small benefit to every country. If each country then increased its abatement, as promised, by an amount corresponding to the benefit it received, this induced abatement would benefit Japan (albeit by a very small amount). If Japan was applying the same strategy, it would increase its abatement by an amount corresponding to the benefits it received from the induced abatement. And so on, until Japan reached an equilibrium where its marginal abatement costs equaled its marginal benefits (both direct and induced). Calculating each country's equilibrium abatement level would be an enormously complex task, given the number of countries and interactions between them. However, the advantage of this approach is that it leaves the resolution of this complexity up to the market. In order to reach its equilibrium abatement level, each country must know only its marginal abatement cost curve and its share of the benefits of each other country's emission reductions—its share of the global social cost of carbon.[119] Moreover, this strategy does not require any country to act altruistically—each country can act entirely on its own national interest and still achieve globally beneficial abatement.

It is not clear whether the equilibrium level of abatement reached by applying this strategy would equal the globally optimal level of abatement, but it seems plausible that the strategy may lead to a Pareto optimal outcome.[120] For example, suppose that Japan was abating below the optimal level (that is, further abatement by Japan would result in benefits to other countries greater than the cost of that abatement). Other countries would be willing to increase their abatement by an amount whose cost equaled their expected benefit from Japan's further

[119] However, as illustrated in Part III, both of these figures involve considerable uncertainty and judgment about factors like the correct discount rate that can make the equilibrium abatement level very difficult to determine.

[120] A Pareto optimal outcome is one where no country could be made better off without making at least one country worse off. Amartya Sen, Markets and Freedoms: Achievements and Limitations of the Market Mechanism in Promoting Individual Freedoms, 45 Oxford Econ. Papers 519, 521 (1993).

abatement, and this would induce Japan to reciprocate by abating more.[121] The benefits each country received from Japan's additional induced abatement would offset the costs of their own additional abatement.[122] Further research would be needed to determine whether this is in fact the case. Either way, this Section has demonstrated that the CBA-based reciprocity strategy may have certain policy advantages in terms of increased efficiency.

This Part has outlined the CBA-based interpretation of reciprocity, discussed its legal defensibility, and suggested some potential legal and policy benefits. The next Part illustrates how the CBA-based interpretation may work in practice by applying it to the Paris Agreement.

III. APPLYING THE CBA-BASED MEASURE OF RECIPROCITY TO THE PARIS AGREEMENT

This Part illustrates the CBA-based measure of reciprocity by applying it to the United States' Nationally Determined Contribution ("NDC") under the Paris Agreement. Although President Trump has pledged to withdraw the United States from the Agreement, a domestic CBA of the United States' NDC remains a useful illustration due to the possibility that the next presidential election will upset President Trump's plans to withdraw, and due to the fact that there is more information available about the potential costs and benefits of the Paris Agreement than other international climate agreements that could

[121] This assumes that the other countries can rely on Japan to apply the CBA-based reciprocity strategy. Absent an enforcement mechanism, this may be a risky assumption. However, if each country had a law comparable to Section 115, which made abatement nondiscretionary upon a finding that emissions were endangering other countries and that the other countries were reciprocating, the assumption would be less risky. Section 115's nondiscretionary duty to abate that is conditional on reciprocity (and that can be revoked if reciprocity is not satisfied) seems to strike a good balance between assuring other countries that the United States will reciprocate and preventing the United States from ending up as the "sucker" that abates on the expectation that other countries will, only to have those countries renege. In other words, Section 115 signals to other countries that the United States has committed to a tit-for-tat strategy.

[122] This would only lead to a Pareto optimal outcome if the other countries were in fact willing to incur the costs of increasing their abatement by a sufficient amount to induce Japan to abate all the way up to the point where no further mutually beneficial abatement was possible.

potentially satisfy Section 115's reciprocity requirement.[123] Moreover, the analysis of the Paris Agreement presented in this Part suggests that the Agreement is far more advantageous to the United States than President Trump has claimed.[124] This analysis may be useful in evaluating arguments for and against going through with President Trump's plan to withdraw from the Agreement.

A precise, detailed analysis of the domestic costs and benefits of the United States' participation in the Paris Agreement is beyond the scope of this Note, and is likely impossible given the significant uncertainties involved. This Part aims only to illustrate how the CBA-based measure of reciprocity proposed in this Note may be applied, and to give an initial ballpark estimate of the relationship between costs and benefits for purposes of determining whether the domestic CBA-based measure of reciprocity could conceivably be used to justify significant greenhouse gas ("GHG") regulation.

Although participation in the Paris Agreement will have long-term costs and benefits, this Part focuses on the year 2025 because this is the year by which the United States has committed to reaching its target, and because the information needed to compare expected costs and benefits is most readily and consistently available for this year. All cost and benefit values in this Part are reported in 2011 dollars. Where this Part uses cost and benefit estimates from other sources, they have been converted into 2011 dollars using the Bureau of Labor Statistics's online Inflation Calculator in order to facilitate comparison between costs and benefits.[125] Similarly, this Part reports all GHG emission figures in metric tonnes of CO_2 equivalent ("tCO_2e"), and figures from other sources have been converted into tCO_2e to facilitate comparisons between them.

[123] See Liptak & Acosta, supra note 10; Shear, supra note 9.

[124] See Press Release, Donald Trump, President of the U.S., Statement by President Trump on the Paris Climate Accord (June 1, 2017), https://www.whitehouse.gov/the-press-office/2017/06/01/statement-president-trump-paris-climate-accord [https://perma.cc/3CVM-UENK] ("The Paris Climate Accord is simply the latest example of Washington entering into an agreement that disadvantages the United States to the exclusive benefit of other countries . . . .").

[125] U.S. Bureau of Labor Statistics, CPI Inflation Calculator, https://data.bls.gov/cgi-bin/cpicalc.pl [https://perma.cc/2FN2-7YH3] (last visited Aug. 6, 2017).

Section III.A estimates the costs of meeting the United States' NDC. Section III.B estimates the benefits that are expected to accrue to the United States from GHG emission reductions made by all parties to the Paris Agreement that have submitted NDCs. Section III.C estimates the net economic effect based on the cost and benefit estimates and discusses the results, which suggest that participation in major climate agreements may be justifiable on the CBA-based interpretation of reciprocity, and that further research is needed to reach more precise domestic cost and benefit estimates.

A. Estimated Costs of Meeting the United States' NDC

In its NDC, the United States pledged to reduce its economy-wide GHG emissions to 26–28% below 2005 levels by 2025.[126] This Section provides four estimates for the cost of achieving this target, each with its advantages and disadvantages. The lowest estimate is based on extrapolation from EPA's estimates of the cost of implementing the Clean Power Plan. A low-intermediate estimate is based on a study conducted by Dr. Andries F. Hof et al. ("Hof study").[127] A somewhat higher intermediate estimate is based on a study conducted by Resources for the Future ("RFF study").[128] The highest estimate is based on a study conducted by NERA Economic Consulting ("NERA study").[129] The estimated costs vary widely, from $4.9 billion to $103.7 billion in 2025.

[126] U.S.A. First NDC Submission, supra note 7, at 1.

[127] Andries F. Hof et al., Global and Regional Abatement Costs of Nationally Determined Contributions (NDCs) and of Enhanced Action to Levels Well Below 2ºC and 1.5ºC, 71 Envtl. Sci. & Pol'y 30, 32 (2017).

[128] Yunguang Chen & Marc A.C. Hafstead, Using a Carbon Tax to Meet US International Climate Pledges 2–4 (Res. for the Future, Discussion Paper 16-48, Nov. 2016), http://www.rff.org/files/document/file/RFF-DP-16-48.pdf [https://perma.cc/XA5A-GEVU].

[129] Paul Bernstein et al., NERA Econ. Consulting, Impacts of Greenhouse Gas Regulations on the Industrial Sector 6 (Mar. 2017), http://assets.accf.org/wp-content/uploads/2017/03/170316-NERA-ACCF-Full-Report.pdf [https://perma.cc/2GWV-PRGF]. In addition to the RFF and NERA studies, the Heritage Foundation has conducted a study which estimates that achieving the United States' NDC will result in a loss of $2.5 trillion over the interval 2015–35. See Kevin D. Dayaratna et al., Heritage Found., Backgrounder: Consequences of Paris Protocol: Devastating Economic Costs, Essentially Zero Environmental Benefits 1 (Apr. 13, 2016), http://thf-reports.s3.amazonaws.com/2016/BG3080.pdf [https://perma.cc/523Z-TVCM]. This Note does not discuss the Heritage Foundation study because that study does not provide the information needed to estimate costs in 2025 (or in any single year), and therefore the Heritage Foundation's estimated costs cannot be meaningfully compared to

Uncertainty about which regulatory pathway the United States will take to achieve its NDC presents a significant challenge in estimating the costs of achievement and may account for a significant amount of the variation in the estimates. Existing and proposed measures will probably not be sufficient to achieve the United States' NDC, so estimating the costs of achieving the target involves some speculation about which regulatory mechanisms will be implemented and how much they will cost.[130] Other factors that may contribute to the variation in cost estimates include differences in the methodologies and modeling techniques employed in different studies,[131] as well as the inherent difficulties in accurately predicting developments in markets and technologies. Furthermore, different studies consider impacts on different sectors, measure costs relative to different baseline scenarios (some studies' baseline scenarios include the CPP, while others do not), and express their findings in terms of different metrics (e.g., total dollars, dollars per ton of emissions reduction, or percentage of GDP), which can make comparisons between the studies difficult and imprecise.[132]

estimated benefits to perform a CBA. Moreover, the Heritage Foundation study has been criticized as misleading and methodologically flawed. See Noah Kaufman, World Res. Inst., Heritage Foundation Gets It Wrong on Costs and Benefits of Climate Action (Mar. 28, 2017), http://www.wri.org/blog/2017/03/heritage-foundation-gets-it-wrong-costs-and-benefits-climate-action [https://perma.cc/2RE7-NVTS]. As far as I know, no other estimates of the cost of achieving the United States' NDC exist as of the time of this publication.

[130] See Belenky, supra note 16, at 16 (estimating that, even under the most optimistic scenario, the United States would achieve a 23% reduction below 2005 emission levels in 2025, leaving a gap of 3%); Vine, supra note 16, at 2 fig.1 (estimating that the United States can achieve a 22.4% reduction below 2005 emission levels by implementing existing and proposed measures, leaving a "gap" of 3.6% in reductions that would need to be filled by additional new measures for the United States to meet its goal of 26–28% reduction).

[131] Cf. Noah Kaufman & Eleanor Krause, The Economic Impacts of the Clean Power Plan: How Studies of the Same Regulation Can Produce Such Different Results 32–35 (World Res. Inst., Working Paper, Jan. 2017) (discussing how different assumptions and modeling techniques can affect estimates of the costs of GHG reduction policies).

[132] For example, EPA's cost estimates for the CPP (which are used to estimate costs of achieving the United States' NDC in Subsection III.A.1 below) include compliance costs but not social costs, and estimate these costs in total inflation-adjusted dollars. See U.S. Envtl. Prot. Agency, Regulatory Impact Analysis for the Clean Power Plan Final Rule, at ES-9 to ES-10 (Aug. 2015) [hereinafter EPA Regulatory Impact Analysis]. The Hof study's cost estimates also "capture the direct costs of emission reduction, but not the macroeconomic implications of these costs." Hof et al., supra note 127, at 32. The RFF study measures costs in dollars per ton of emission reduction and in percentage of GDP, and includes costs

However, this Section does not aim to arrive at a precise estimate of the cost of achieving the United States' NDC. Rather, the purpose of this Section is to briefly survey the methods currently available for estimating the cost of achieving the United States' NDC, and to arrive at some rough cost estimates that can be used in this Part's CBA. The significant variation in the cost estimates also helps illustrate how variation in domestic costs and benefits affects reciprocity determinations on the CBA-based interpretation of reciprocity.

1. Cost Estimate Based on EPA's CPP Compliance Cost Estimates

One method of estimating the cost of achieving the United States' NDC is to extrapolate from EPA's estimates of the CPP's implementation cost. This approach assumes that the average cost per unit of emission reduction (measured in dollars per tCO_2e) is the same for achieving the United States' NDC as for implementing the CPP, and then multiplies that cost by the total amount of emission reductions needed to achieve the NDC (measured in tCO_2e). An advantage of this approach is that it is based on figures calculated by EPA, and will therefore rely on many of the same foundational assumptions about abatement costs, etc. that EPA uses. To the extent that the assumptions and methodologies applied by independent analyses may differ from those applied by EPA, this approach may offer a more realistic example of how EPA is likely to conduct its CBA in making a reciprocity determination.[133]

A major disadvantage of this approach is that it does not directly estimate the costs of all the measures that will be needed to achieve the United States' NDC. Rather, it uses a ballpark figure for the average cost of reducing emissions by one unit, which was developed in a specific context (the CPP's regulation of emissions from the electricity generation sector), and which may not accurately reflect the likely costs of abating emissions from other sectors. Emissions reductions in

beyond compliance costs, including "the adjustment costs associated with the installation or removal of physical capital." Chen & Hafstead, supra note 128, at 2–4 (Nov. 2016), http://www.rff.org/files/document/file/RFF-DP-16-48.pdf [https://perma.cc/5QHB-S4EE].

[133] There is some reason to believe that these assumptions and methodologies vary considerably between independent analyses, and that they have significant impacts on estimates of costs and benefits. See Kaufman & Krause, supra note 131, at 32–35.

different sectors resulting from different mitigation measures will have varying prices, and each additional unit of reduction will cost more than the last, so achieving reductions beyond those achieved by the CPP can be expected to come at a higher cost. The fact that this approach yields a substantially lower estimate of the cost of achieving the United States' NDC than the three studies discussed in this Part further suggests that this estimate may not be completely accurate.[134]

That said, there are reasons to believe that the estimates yielded by this approach will at least be in the right ballpark. The CPP is estimated to reduce emissions by 399 $MtCO_2e$ in 2025, bringing the United States about 31% of the way to reaching its NDC target.[135] The electricity generation sector represents about 30% of total U.S. GHG emissions.[136] Thus, the percentage of needed reductions achieved by the CPP is approximately equal to the percentage of total emissions represented by electricity generation. If every sector similarly "pulls its weight" by providing a percentage of the needed reductions roughly equal to the percentage of emissions represented by that sector, we can expect to reach roughly the same point on the marginal abatement cost curve for each sector. Therefore, as long as the marginal abatement cost curves are not too different from one sector to the next, it is not unreasonable to assume that the average unit cost of all emission reductions needed to achieve the NDC roughly equals the unit cost of reductions achieved by the CPP. Moreover, regulating under Section 115 could provide the flexibility to trade emissions between sectors, which could help keep the NDC's cost per ton of emission reductions from exceeding that of the CPP by a wide margin.[137] Some of the discrepancy between the low cost estimate derived using this approach and the estimates derived using the Hof, RFF, and NERA studies may be due to the differing scope of costs considered by the studies. EPA's Regulatory Impact Analysis ("RIA") for the CPP considers only compliance costs, and the RFF and NERA

[134] See infra Subsection III.A.2.

[135] Belenky, supra note 16, at 6 tbl.3.

[136] U.S. Envtl. Prot. Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2014, at ES-23 (April 2016).

[137] See Burger et al., supra note 2, at 412 (noting also that "[i]t is likely that relatively low-cost emissions reductions will remain in the power sector even after implementation of the Clean Power Plan").

studies consider social costs as well.[138] To the extent that these scopes differ, EPA's RIA for the CPP is likely more representative of the scope of costs that EPA would consider in making a CBA-based reciprocity determination.

EPA's estimates of the CPP's implementation costs translate to \$12.53/tCO_2 in 2025 if states adopt a "mass-based" approach to implementing the CPP, and \$4.75/tCO_2 in 2025 if states adopt a "rate-based" approach.[139] Although these implementation costs represent distinct illustrative scenarios, rather than high and low cost estimates, they give the high and low ends of EPA's compliance cost estimates for 2025. Thus, a range of \$5–15/tCO_2e is a reasonable and conservative ballpark estimate of the cost per ton of achieving the United States' NDC based on extrapolation from CPP implementation costs. The total amount of GHG reductions needed to achieve the United States' NDC (in tCO_2e) is the difference between the emissions that would result from a BAU baseline scenario and a level of emissions that is 26% lower than 2005 emissions.[140] Based on BAU projections reported by Maria Belenky, this represents a reduction of 0.985–1.28 metric gigatonnes of CO_2 equivalent ("$GtCO_2e$") in 2025 relative to a BAU baseline.[141]

Thus, the total cost of achieving the United States' NDC, as estimated using the approach in this Subsection, ranges from \$4.9 billion to \$19.2 billion in 2025.

[138] Compare EPA Regulatory Impact Analysis, supra note 132, at ES-10, with Chen & Hafstead, supra note 128, at 4, and Bernstein et al., supra note 129, at 6.

[139] See EPA Regulatory Impact Analysis, supra note 132, at ES-6 to ES-7, ES-9. These estimates account for only the cost per ton of carbon dioxide emissions and do not consider reductions in other GHGs. Id. at ES-21. This means that the cost per ton values calculated from the RIA are likely higher than the actual cost per unit of GHG emissions measured in \$/tCO_2e. Based on Belenky's estimates that the CPP will reduce the United States' GHG emissions by 399 megatons in 2025, the cost per ton in \$/tCO_2e would be \$7.52 on the mass-based approach and \$2.51 in 2025 on the rate-based approach.

[140] A 26% reduction would be sufficient to achieve the NDC, which pledges a 26–28% reduction from 2005 levels.

[141] See Belenky, supra note 16, at 4 tbl.2.

2. Cost Estimate Based on Hof, RFF, and NERA Studies

The Hof study estimates that meeting the United States' NDC will cost $18.1 billion to $33.6 billion.[142]

The RFF study estimates the cost of meeting the United States' NDC in dollars per tCO2e reduced, and in terms of percent reduction in real GDP in 2025.[143] The dollars per tCO2e figure can be converted into a total cost estimate by multiplying by the total amount of GHG reductions needed to achieve the United States' NDC (in tCO_2e). Using the RFF study's unit cost of $33 per tCO_2e reduction and 0.985–1.28 $GtCO_2e$ as the total reduction, the cost in 2025 of achieving the United States' NDC would range from $32.5 billion to $42.2 billion. The Congressional Budget Office estimates that the United States' real GDP in 2025 will be $20.6 trillion.[144] A 0.35% reduction in real GDP, which represents the cost of achieving the United States' NDC on the RFF study's other method of estimating cost, would thus be $72.1 billion.

The NERA study estimates that meeting the United States' NDC will result in a GDP decrease of $103.7 billion in 2025 in its scenario modeled on regulation under Section 115.[145]

B. Estimated U.S. Benefits from Global Emission Reductions Attributable to NDCs

The United Nations Framework Convention on Climate Change Secretariat has estimated that the 119 Intended Nationally Determined Contributions ("INDCs") that have been submitted will result in aggregate emission reductions of 2.8 $GtCO_2e$ in 2025 (with a range of

[142] Hof et al., supra note 127, at 34 tbl.2. Note that Hof et al.'s estimate of the total amount of GHG reductions required to meet the United States' NDC is slightly larger than the amount calculated based on Belenky. See supra note 141 and accompanying text. As a result, Hof et al.'s cost per ton of attaining the NDC is slightly lower than it appears, ranging from $9.65 to $24.54 per tCO_2e.

[143] Chen & Hafstead, supra note 128, at 2–4.

[144] U.S. Cong. Budget Office, Budget and Economic Data: 10-Year Economic Projections, June 2017, https://www.cbo.gov/about/products/budget-economic-data#4 [https://perma.cc/8UMQ-4K6D].

[145] Bernstein et al., supra note 129, at 42, 77.

0.2–5.5).[146] These emission reduction estimates can be converted into benefits expected to accrue to the United States using the social cost of carbon ("SCC"). The SCC represents the monetary benefit of reducing GHG emissions by one unit. The Interagency Working Group on the Social Cost of Carbon ("Working Group") has developed a set of SCC values for use in government CBAs.[147] The SCC "is highly sensitive to the discount rate" used to account for the fact that avoiding climate impacts in the future has less economic value than avoiding the same impacts today.[148] The SCC also increases over time to reflect the increased marginal impacts of additional emissions as more GHGs are added to the atmosphere and climate change worsens.[149] Accordingly, the Working Group has developed a set of four SCC values for each year, which represent the average expected economic impact of each ton of CO_2 emissions at discount rates of 5, 3, and 2.5%, and the 95th percentile economic impact on a 3% discount rate.[150] The most recent SCC values for 2025 (in 2011 dollars per tCO_2) are about $15 (5% discount rate), $50 (3% discount rate), $74 (2.5% discount rate), and $150 (95th percentile, 3% discount rate).[151] Although the Working Group emphasizes that all four values should be considered, regulatory impact analyses tend to focus on the central values based on a 3% discount rate, so this Note will focus on the value of $50/$tCO_2$ in 2025.[152]

[146] U.N. Secretariat, Synthesis Report on the Aggregate Effect of the Intended Nationally Determined Contributions 10, U.N. Doc. FCCP/CP/2015/7 (Oct. 30, 2015) [hereinafter Synthesis Report on INDCs].

[147] Interagency Working Grp. on Soc. Cost of Carbon, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (Feb. 2010), https://www.epa.gov/sites/production/files/2016-12/documents/scc_tsd_2010.pdf [https://perma.cc/GP9H-QP3E].

[148] U.S. Envtl. Prot. Agency, EPA Fact Sheet: Social Cost of Carbon 3 (Dec. 2016), https://www.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf [https://perma.cc/A6EA-TKTH].

[149] Id. at 1.

[150] Id. at 3. The last SCC value is meant to represent the economic impacts of potential catastrophic outcomes, which are lower probability but higher impact.

[151] Id. at 4.

[152] Interagency Working Grp. on Soc. Cost of Greenhouse Gases, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, at 4 (Aug. 2016), https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf [https://perma.cc/8FYX-W9AS].

The SCC is normally calculated to reflect the global benefits of emission reductions rather than domestic benefits.[153] However, on the CBA-based interpretation of Section 115(c), reciprocity is based on the United States' domestic benefits that result from other countries' emission reductions. Thus, global SCC values have been converted to domestic benefits using estimates of the U.S. share of global benefits developed by the Working Group.[154] The Working Group has tentatively estimated that benefits to the United States of emission reductions may range from 7–10% of total global benefits (based on low-end results from the Climate Framework for Uncertainty, Negotiation and Distribution ("FUND") integrated assessment model)[155] to 23% (based on the United States' share of global GDP) but has cautioned that these figures are "approximate, provisional, and highly speculative."[156] These figures almost certainly underestimate the domestic benefits of emission reductions because they do not account for "spillover" effects—"indirect costs to trade, human health, and security likely to 'spill over' to the United States as other regions experience climate change damages."[157]

Combining the estimates above gives a domestic SCC ranging from about $1 to $34.50 per tCO_2e in 2025. This wide range can lead to great uncertainty in estimating the domestic benefits of emission reductions. Given the data available, a reasonable central estimate of a domestic

[153] See, e.g., EPA Regulatory Impact Analysis, supra note 132, at 4-4 to 4-5 (applying a global SCC and discussing reasons for preferring it over a domestic figure); see also Howard & Schwartz, supra note 109.

[154] Interagency Working Grp. on Soc. Cost of Carbon, supra note 147, at 11.

[155] An integrated assessment model is a mathematical model that predicts how GHG emission-causing activities will affect the climate, and how this will in turn affect human activities and economies.

[156] Interagency Working Grp. on Soc. Cost of Carbon, supra note 147, at 11.

[157] Howard & Schwartz, supra note 109, at 238, 238–41 (discussing spillover effects and arguing that they result in significant underestimates of domestic SCC values); Interagency Working Grp. on Soc. Cost of Carbon, supra note 147, at 11. A study conducted by New York University School of Law's Institute for Policy Integrity has suggested that both the worldwide emission reductions resulting from all countries' NDCs and the domestic SCC may be considerably greater than the values discussed here. Peter Howard & Jason Schwartz, Inst. for Policy Integrity, Foreign Action, Domestic Windfall: The U.S. Economy Stands to Gain Trillions from Foreign Climate Action 6–7, 10–13 (Nov. 2015). However, this study was conducted prior to the Paris Agreement and does not provide the information needed to estimate benefits in 2025 (or in any single year), and therefore is not used in this Note's illustration of the CBA-based interpretation of reciprocity.

SCC is about $5 per tCO_2e in 2025.[158] Applying the domestic SCC to the estimated emission reductions from all NDCs yields domestic benefits ranging from $213 million to $190 billion in 2025, with a central estimate of $14 billion.[159]

C. Estimated Net Domestic Effect from the Paris Agreement

Subtracting the expected costs of meeting the United States' NDC from the expected domestic benefits from all parties' NDCs yields a net expected effect that can be used in making a reciprocity determination under Section 115(c). Based on the estimates above, the net effect could range from a net cost of $103.4 billion to a net benefit of $185.0 billion in 2025. This large range highlights the significant uncertainty in estimating implementation costs, the sensitivity of SCC values to changes in the discount rate, and the uncertainty in estimating the domestic share of climate impacts. The range of possible outcomes, as well as the influence of using the different cost estimates discussed in Section III.A, can be put into perspective by comparing the central benefit estimate of $14 billion with the various cost estimates. Comparing this central benefit estimate to the cost estimates based on extrapolation from CPP implementation costs yields net results ranging from a net benefit of $9.1 billion to a net cost of $5.1 billion in 2025. Comparing the central benefit estimate to the cost estimates based on the Hof study yields a net cost ranging from $4.1 to 9.5 billion in 2025. Comparing the central benefit estimate to the cost estimates based on the RFF study's cost-per-ton estimate yields a net cost ranging from $18.5 to 28.2 billion in 2025. Comparing the central benefit estimate to the

[158] This is based on a 3% discount rate (the central value used by the Working Group) and a 10% U.S. share of global emission reduction benefits. The 10% figure is at the high end of the Working Group's estimated U.S. share based on results from the FUND model. The model-based approach is likely superior to the GDP-based approach, since "[t]here is no a priori reason why domestic benefits should be a constant fraction of net global damages over time." Interagency Working Grp. on Soc. Cost of Carbon, supra note 147, at 11. Using the high-end value given by the FUND model seems reasonable and conservative, since FUND yields the lowest SCC values of the three integrated assessment models used by the Working Group. Id. at 8–10. Furthermore, using the high-end value helps compensate for the fact that FUND does not account for spillover costs.

[159] The central estimate is calculated based on $5 per tCO_2e domestic SCC and the United Nations' central estimate of 2.8 $GtCO_2e$ in emission reductions. Synthesis Report on INDCs, supra note 146, at 10.

cost estimate based on the RFF study's percentage-of-GDP estimate yields a net cost of $58.1 billion in 2025. Comparing the central benefit estimate to the cost estimate based on the NERA study yields a net cost of $89.7 billion in 2025. Table 1 gives the cost estimates from the four studies discussed in Section III.A. Table 2 compares these four sets of cost estimates with four sets of benefit estimates based on different discount rate, domestic share of global SCC, and worldwide GHG reduction inputs. Positive numbers indicate net benefits and negative numbers indicate net costs.

Table 1: Cost Estimates of Achieving the United States' NDC (in billions of 2011 dollars)

Extrapolation from CPP (EPA)	Hof Study	RFF Study		NERA Study
		($/tCO$_2$e measure)	(% of GDP measure)	
4.9 to 19.2	18.1 to 33.6	32.5 to 42.2	72.1	103.7

Table 2: Summary of Domestic CBA Results for Paris Agreement (net economic effect in billions of 2011 dollars)

	Extrapolation from CPP (EPA)	Hof Study	RFF Study		NERA Study
			($/tCO$_2$e measure)	(% of GDP measure)	
Low Benefit Estimate[160]	-4.7 to -18.9	-17.9 to -33.3	-32.3 to -42.0	-71.9	-103.4
Central Benefit Estimate[161]	9.1 to -5.1	-4.1 to -19.5	-18.5 to -28.2	-58.1	-89.6
High Benefit Estimate[162]	74.4 to 88.7	60.0 to 75.4	51.4 to 61.1	21.5	-10.1
Catastrophic Scenario Benefit Estimate[163]	170.8 to 185.0	171.8 to 156.4	147.8 to 157.4	117.8	86.3

Although these results are speculative and involve great uncertainties, some useful insights may be drawn from them. First, the analysis suggests that expected benefits are on the right order of magnitude to potentially outweigh expected costs. The CBA-based measure of reciprocity yields a net benefit for the Paris Agreement when the central benefit estimate is compared to the low cost estimate based on extrapolation from the CBA for the CPP, and yields a net benefit under every cost estimate if a higher-end SCC value is used. This shows that there is at least a viable possibility of justifying participation in major

[160] Based on a 5% discount rate, a 7% domestic share of global SCC, and a 0.2 GtCO$_2$e reduction from all NDCs. These inputs yield a domestic climate benefit of $213 million. For all net economic impact values, positive numbers indicate net benefits and negative numbers indicate net costs.

[161] Based on a 3% discount rate, a 10% domestic share of global SCC, and a 2.8 GtCO$_2$e reduction from all NDCs. These inputs yield a domestic climate benefit of $14.0 billion.

[162] Based on a 2.5% discount rate, a 23% domestic share of global SCC, and a 5.5 GtCO$_2$e reduction from all NDCs. These inputs yield a domestic climate benefit of $93.6 billion.

[163] Based on the 95th percentile economic impact on a 3% discount rate, a 23% domestic share of global SCC, and a 5.5 GtCO$_2$e reduction from all NDCs. These inputs yield a domestic climate benefit of $189.9 billion.

climate agreements on the basis of a domestic CBA, which is critical if the CBA-based measure of reciprocity is to have real-world application to regulating GHGs under Section 115. This showing is enough to justify further research into the expected aggregate emission reductions resulting from the NDCs, the U.S. share of the global SCC, and the total cost of meeting the United States' NDC. There is reason to believe that the costs of achieving the United States' NDC may be lower than initially projected due to market trends toward greater use of electric vehicles and renewable energy.[164] There is also reason to believe that both the global and domestic benefits of reducing GHG emissions may be higher than currently estimated.[165] If further research confirms that the United States does in fact receive a net climate benefit from the Paris Agreement, a CBA-based measure of reciprocity could help inform decisions about how much to increase the United States' NDC in the future (as is contemplated by the Paris Agreement).[166]

Second, the CBA outlined in this Part only includes benefits that are based on mitigating the effects of climate change—all benefits are derived from the SCC. Thus, this CBA suggests that the *climate* benefits accruing to the United States as a result of the Paris Agreement may outweigh the cost of achieving its NDC, independent of any ancillary benefits. It therefore gives some support to the proposition in Subsection II.C.2 that a CBA-based interpretation of reciprocity may provide a way

[164] See Justin Gillis & Nadja Popovich, In Trump Country, Renewable Energy Is Thriving, N.Y. Times (June 6, 2017), https://www.nytimes.com/2017/06/06/climate/renewable-energy-push-is-strongest-in-the-reddest-states.html; Brad Plumer, When Will Electric Cars Go Mainstream? It May Be Sooner Than You Think, N.Y. Times (July 8, 2017), https://www.nytimes.com/2017/07/08/climate/electric-cars-batteries.html. But see Eduardo Porter, How Renewable Energy Is Blowing Climate Change Efforts Off Course, N.Y. Times (July 19, 2016), https://www.nytimes.com/2016/07/20/business/energy-environment/how-renewable-energy-is-blowing-climate-change-efforts-off-course.html.

[165] See J.C.J.M. van den Bergh & W.J.W. Botzen, A Lower Bound to the Social Cost of CO_2 Emissions, 4 Nature Climate Change 253, 256 (2014) (arguing that the global SCC should be set at \$125/tCO_2e or higher); U.S. Glob. Change Research Program, Climate Science Special Report: Fifth-Order Draft 12 (June 28, 2017), http://www.nytimes.com/packages/pdf/climate/2017/climate-report-final-draft-clean.pdf [https://perma.cc/96GP-FQ85] (discussing developments in scientific understanding of the impacts of climate change on the United States).

[166] Paris Agreement, supra note 6, art. 4.3 ("Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution . . . .").

to justify significant climate regulation without appealing to ancillary benefits. Moreover, this Part shows that the Paris Agreement may satisfy Section 115(c) even on the CBA-based interpretation, which is arguably one of the narrowest interpretations of the section.[167] This suggests that the United States' NDC under the Paris Agreement set an appropriately conservative emission reduction target, and that regulation under Section 115 may be well suited to achieving this target. The CBA-based measure of reciprocity is even more likely to yield a net benefit if ancillary domestic benefits such as energy savings and reduced emissions of conventional pollutants are considered. Such an approach would forego any potential benefits of focusing exclusively on climate benefits,[168] but it is compatible with the CBA-based approach to measuring reciprocity under Section 115(c).

CONCLUSION

This Note has proposed an interpretation of Section 115(c) of the Clean Air Act that measures reciprocity by comparing the benefits to the United States resulting from other countries' emission reductions with the United States' costs of reducing its own emissions. It has argued that this interpretation may be legally defensible in light of Section 115(c)'s broad language that allows for various interpretations, judicial presumptions in favor of considering the costs and benefits of regulation, Section 115's goal of securing reciprocal benefits from foreign countries, and the reciprocity requirement's inextricable link to the extent of the rights provided by Section 115.

The CBA-based interpretation may have various legal and policy advantages. First, it may help avert challenges to regulation of greenhouse gases under Section 115 based on the major questions doctrine by providing a limiting principle on EPA's regulatory authority under the section. Second, it may provide a basis for showing that the domestic climate benefits associated with regulation of greenhouse gases under Section 115 outweigh the costs, without relying on controversial ancillary benefits or foreign climate benefits. Third, it may represent a rational strategy for approaching international climate

[167] See supra text accompanying notes 47–48.

[168] See supra Subsection II.C.2.

negotiations that could lead to a Pareto optimal outcome if adopted by all countries. There are still many open questions related to these potential advantages, especially questions regarding the likely application of the major questions doctrine and the theoretical foundation for the suggestion that a CBA-based strategy could lead to a Pareto optimal outcome.

Finally, this Note has illustrated the CBA-based interpretation of reciprocity by applying it to the United States' Nationally Determined Contribution under the Paris Agreement. The results of such a CBA are highly uncertain based on available data, but expected benefits are on the right order of magnitude to potentially outweigh expected costs. This shows that the CBA-based interpretation of reciprocity at least stands a chance of justifying participation in major climate agreements. The CBA could be improved by further research into the United States' share of the global social cost of carbon and the expected aggregate emissions reductions from all Nationally Determined Contributions submitted under the Paris Agreement.