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Incentive Compatible Climate Change Mitigation: Moving Beyond the Pledge and Review Model

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INCENTIVE COMPATIBLE CLIMATE CHANGE MITIGATION: MOVING BEYOND THE PLEDGE AND REVIEW MODEL

GABRIEL WEIL*

ABSTRACT

Climate change represents a global commons problem, where individuals, businesses, and nation-states all lack sufficient incentives to reduce their greenhouse gas emissions to levels consistent with meeting their collectively agreed upon mitigation goals. The current “pledge and review” paradigm for global climate change mitigation, which many see as a major breakthrough, relies primarily on moral pressure, reputational incentives, and global public opinion to foster cooperation on mitigation efforts over and above those driven by maximization of narrow conceptions of national interests. Given the scale of the emissions reductions required to meet stated mitigation goals, the substantial economic costs of deep decarbonization, and the central role of fossil fuels in the global economy, these soft factors are likely to prove too weak. Projections based on the pledges embodied in the Paris Agreement indicate that the world is not on a path to avoiding dangerous anthropogenic interference with the global climate, and there is no enforcement mechanism to assure that the commitments made in Paris are kept. These limitations suggest the need for more robust mechanisms to encourage adoption of emissions controls based on the full global costs they generate. This Article discusses four possibilities: (1) strategic emissions abatement policies; (2) linking climate change mitigation with other geopolitical issues, with a particular emphasis on trade; (3) introduction of a globally harmonized carbon price, with design features adjusted to induce reluctant countries to participate; and (4) relaxation of national sovereignty in favor of a sovereign global climate authority. Each of these options presents its

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own set of risks and challenges, but all must be considered in light of the importance of achieving robust global coordination on climate change mitigation and of the currently dim prospects for doing so.

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I. BACKGROUND AND HISTORY OF PLEDGE AND REVIEW

When the United Nations Framework Convention on Climate Change (“UNFCCC”) was negotiated at the 1992 Rio Earth Summit, it was widely assumed that greenhouse gas (“GHG”) emissions would be contained via a treaty that set binding limits on those emissions. The UNFCCC also established a sharp division between developing countries and the developed countries listed in Annexes I and II, with the primary burden placed upon the latter.¹ This was in recognition of the lower per capita emissions of developing countries as well as the historical role of developed countries in contributing to the existing stock of GHGs in the

¹ Parties & Observers, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/parties_and_observers/items/2704.php [<https://perma.cc/6MLR-RX3J>] (last visited Mar. 19, 2018).

atmosphere.² This division was enshrined in the UNFCCC’s principle of “common but differentiated responsibilities.”³

At the third Conference of the Parties to the UNFCCC (“COP 3”) in Kyoto in 1997, this principle was actualized in an agreement, the Kyoto Protocol, that set specific and legally binding emissions targets for developed countries. Developing countries were only required to report their emissions.⁴ The absence of emissions reduction targets for developing countries in the Kyoto Protocol precluded its ratification by the United States.⁵ In July 1997, during the run-up to COP 3, the U.S. Senate passed the Byrd-Hagel Resolution by a vote of 95–0.⁶ The Resolution indicated the

sense of the Senate that—the United States should not be a signatory to any . . . agreement . . . which would mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period[.]

While it is far from clear that the Senate would have ratified an alternative version of the Kyoto Protocol that imposed binding emissions commitments on developing countries, the version that Vice President Gore signed was dead on arrival and indeed was never even submitted to the Senate for ratification.⁷

Nonetheless, the Kyoto Protocol did enter into force in February 2005, with its first commitment period running from 2008 through 2012.⁸

² United Nations Framework Convention on Climate Change, May 1, 1992, S. Treaty Doc. 102-38, I.L.M. 851, at *preamble*.

³ *Id.*

⁴ Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

⁵ S. Res. 98, 105th Cong., at *preamble* (1997).

⁶ *Id.*

⁷ Frank Gaffney, *Al Gore’s Climate Treaty—Dead On Arrival*, CENTER FOR SECURITY POLICY (Dec. 11, 1997), <https://www.centerforsecuritypolicy.org/1997/12/11/al-gores-climate-treaty-dead-on-arrival-2/> [<https://perma.cc/J23F-WBWX>].

⁸ Kyoto Protocol, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/kyoto_protocol/items/2830.php [<https://perma.cc/F2LD-YTFK>] (last visited Mar. 19, 2018).

A second commitment period was agreed to under the Doha Amendment in 2012, but the Doha Amendment never entered into force.⁹ The developed country parties to the Kyoto Protocol generally met their commitments and the agreement very likely resulted in a net reduction in the growth of global emissions when compared to a scenario where no treaty was adopted. However, these reductions below business as usual were fairly modest on the global scale.¹⁰ Moreover, as the growth of developing country economies and GHG emissions in the intervening years made clear, the basic framework of the Kyoto Protocol was incapable of achieving the deep emissions reductions required to stabilize atmospheric GHG concentration at a level consistent with avoiding dangerous anthropogenic climate change.¹¹ Canada also withdrew as a party to Kyoto in December 2011 and suffered no apparent consequences, calling into question the significance and value of a binding agreement.¹²

As frustration with the Kyoto approach grew, due both to the non-participation of the United States and the inadequacy of any agreement that does not include curbs on developing country emissions, policymakers began searching for alternatives. Any new approach would need to address the strong resistance among developing countries to having binding emissions reductions imposed on them as well as the refusal of the U.S. Senate to accept legally binding emissions limits that might harm the U.S. economy, especially if developing countries do not face similar restrictions. The result was a gradual shift, sparked by a Bush Administration proposal in 2007, toward a “bottom-up,” voluntary, non-binding approach, often referred to as pledge and review, which calls for each country to choose its own emissions goal and report back on its progress.¹³ Many climate mitigation advocates see this as an important breakthrough and a more viable path to achieving stabilization of atmospheric GHG concentrations

⁹ *Status of the Doha Amendment*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/kyoto_protocol/doha_amendments/items/7362.php [<https://perma.cc/SDG5-XAK7>] (last visited Mar. 19, 2018).

¹⁰ WORLD BANK, *WORLD DEVELOPMENT REPORT 2010: DEVELOPMENT AND CLIMATE CHANGE* 4, 79 (2010).

¹¹ *Id.*

¹² *A Climate Change Plan for the Purposes of the Kyoto Protocol Implementation Act 2012: Canada's Withdrawal from the Kyoto Protocol*, ENV'T. & CLIMATE CHANGE CANADA, <https://www.ec.gc.ca/Publications/default.asp?lang=En&n=EE4F06AE-1&xml=EE4F06AE-13EF-453B-B633-FCB3BAECEB4F&offset=3&toc=hide> [<https://perma.cc/97WX-WPK7>] (last visited Mar. 19, 2018).

¹³ Matt McGrath, *Did Dubya help to save the world?*, BBC NEWS (Dec. 15, 2015), <http://www.bbc.com/news/science-environment-35096475> [<https://perma.cc/337B-H2BA>].

at a relatively safe level.¹⁴ This approach culminated in the Paris Agreement adopted at COP 21 in December 2015.¹⁵ In October 2016, the Agreement reached the ratification threshold of at least fifty-five UNFCCC parties representing at least 55% of global GHG emissions. It entered into force in November 2016.¹⁶

II. LIMITS OF VOLUNTARY MODEL

While the pledge and review approach has produced pledges of greater emissions reduction (below business as usual) from more nations than the Kyoto Protocol, it is inadequate to achieve the deep emissions reductions required. Even the non-binding promises being made are insufficient to achieve stabilization at a level that climate science tells us is safe, and there is no legal obligation or enforcement mechanism to ensure these reductions are achieved. Since most of the Nationally Determined Contributions (“NDCs”) in the Paris Agreement only extend to 2030, there is inevitable uncertainty in projecting the agreement’s impact of temperature rise. However, credible estimates based on modelling of future emissions trajectories project a temperature rise of around 2.7–3.7 degrees Celsius.¹⁷ The International Energy Agency’s World Energy Outlook 2016 projected that under the Paris Agreement, global GHG emissions would continue rising by 0.5% per year through 2040, using up the entire carbon budget consistent with limiting temperature rise to two degrees Celsius by the mid-2040s in their central scenario.¹⁸

¹⁴ *Id.*

¹⁵ *The Paris Agreement*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/paris_agreement/items/9485.php [<https://perma.cc/QW8A-RG9P>] (last visited Mar. 19, 2018).

¹⁶ *Id.*

¹⁷ See INT’L ENERGY AGENCY, ENERGY AND CLIMATE CHANGE: WORLD ENERGY OUTLOOK SPECIAL BRIEFING FOR COP21 4 (2015), https://www.iea.org/media/news/WEO_INDC_Paper_Final_WEB.PDF [<https://perma.cc/MTV8-WTXS>]; Joeri Rogelj et al., *Paris Agreement climate proposals need a boost to keep warming well below 2 °C*, 534 NATURE 631, 631 (2016); ALBAN KITOUS & KIMON KERAMIDAS, ANALYSIS OF SCENARIOS INTEGRATING THE INDCs 2–3 (2015), <https://ec.europa.eu/jrc/sites/jrcsh/files/JRC97845.pdf> [<https://perma.cc/7LMX-H7CV>]; U.N. ENVTL. PROGRAM, THE EMISSIONS GAP REPORT 2015—EXECUTIVE SUMMARY 2 (2015), http://uneplive.unep.org/media/docs/theme/13/EGR_2015_ES_English_Embargoed.pdf [<https://perma.cc/SDG9-F4VK>]; CLIMATE ACTION TRACKER, <http://www.climateactiontracker.org/> [<https://perma.cc/L4P4-2NGS>] (last visited Mar. 19, 2018).

¹⁸ INT’L ENERGY AGENCY, FACT SHEET: WORLD ENERGY OUTLOOK 2016 (2016), <https://www.iea.org/media/publications/weo/WEO2016Factsheet.pdf> [<https://perma.cc/63CQ-MJMF>].

For context, stabilization of atmospheric GHGs at any level will ultimately require a reduction of global emissions to match the earth's natural capacity to remove GHGs from the atmosphere. That capacity is approximately 5 Gt CO_{2e} per year,¹⁹ just over 10% of 2010's 49 Gt CO_{2e} emissions.²⁰ Stabilizing at the relatively modest goal of 550 ppm CO_{2e}, corresponding to a projected temperature rise of three degrees Celsius, would require global emissions to peak by 2025 and then fall by at least 1–3% every year.²¹ A 25% reduction below 2005 levels would have to be achieved around 2050.²² If emissions peak later, more rapid reductions would be required to achieve the same stabilization goal. If emissions peak too late or too high, the stock of

GHGs would grow to exceed the stabilization target, requiring reductions below 5 Gt CO_{2e} per year to eventually restore GHG concentrations to the target.²³ The same result would occur if post-peak emissions cuts are not made fast enough.²⁴ A number of scenarios, based on a stabilization goal of 550 ppm CO_{2e}, are illustrated below.²⁵

¹⁹ NICHOLAS STERN, STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE 291 (2007). This statement assumes that we do not implement geoengineering measures that remove GHGs from the atmosphere. If this kind of geoengineering is employed, the relevant metric becomes net anthropogenic emissions (anthropogenic emissions minus the quantity of GHGs removed by human activity), which still must be brought down to 5 GT CO_{2e}. Geoengineering approaches that mitigate warming without removing GHGs would not alter the stabilizing emissions rate, though they might have the potential to make stabilization unnecessary.

²⁰ IPCC, SUMMARY FOR POLICY MAKERS 6 (2014), https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf [<https://perma.cc/2CGG-Y2VR>] [hereinafter IPCC SUMMARY FOR POLICYMAKERS].

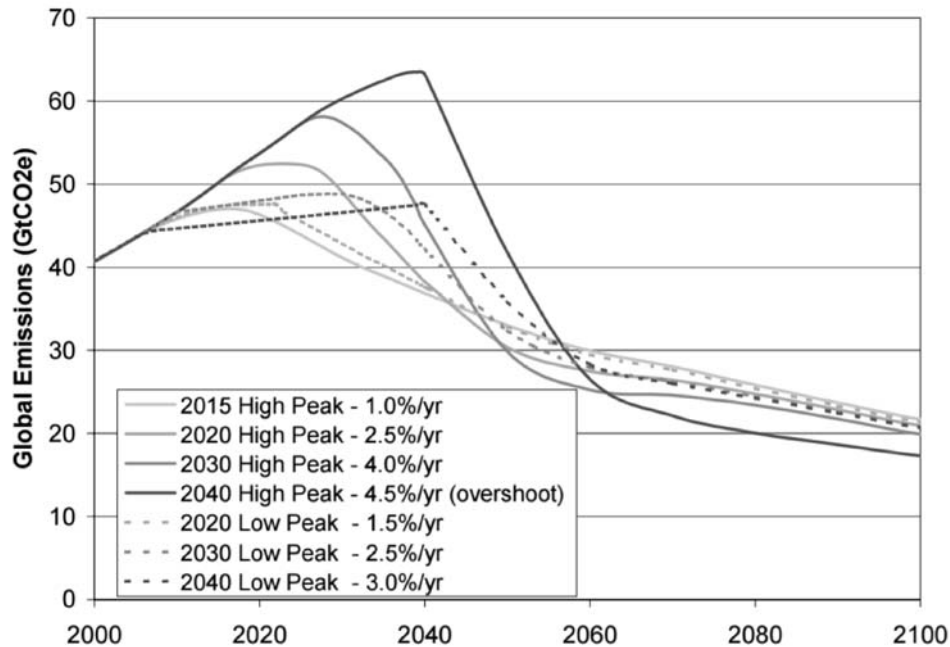
²¹ STERN, *supra* note 19, at 193.

²² *Id.*

²³ *Id.* at 200–01.

²⁴ *Id.* at 193, 199–201.

²⁵ *Id.* at 199. The figure is from Stern's Figure 8.2, and was generated using the SiMCaP EQW model (Meinshausen et al. 2006).



Defenders of the pledge and review paradigm contend that future rounds of NDCs will grow in ambition as countries compete with each other, which will generate a positive feedback loop. Similarly, some argue that the transparency provisions will facilitate a “name and shame” dynamic that will compel parties to ramp up their commitments. I certainly hope this transpires, but there are reasons to be skeptical. At a basic level, climate change is a global commons problem.²⁶ For most countries, the impact of their own emissions on the magnitude of climate change impacts they will experience is negligible, since they are only responsible for a small fraction of global emissions.²⁷ Even for the largest emitters, like the United States and China, most of the benefits from reducing their emissions accrue to the rest of the world.²⁸ That is, there

²⁶ Peter H. Howard & Jason A. Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon* 13 (N.Y.U. Sch. of Law & Inst. for Policy Integrity, Working Paper No. 3, 2016), http://policyintegrity.org/files/publications/Global_Social_Cost_of_Carbon_Reciprocity.pdf [https://perma.cc/JH6L-JVWA].

²⁷ *Id.*

²⁸ *Id.*

is a substantial divergence between the domestic and global social costs of carbon.²⁹ This creates an incentive structure where, all else being equal, it is in the interest of every country to free ride and let others bear the burden of climate change mitigation.³⁰

This situation stands in contrast to the problem of ozone depletion due to chlorofluorocarbon (“CFC”) emissions, for which steep unilateral emissions cuts would have produced large net benefits for most parties to the Montreal Protocol.³¹ In game theory terms, ozone depletion presented a “no-conflict” game where phasing out CFCs was the dominant strategy for most countries.³² In the climate change context, some margin of GHG emissions reductions will be cheap enough and/or produce sufficient co-benefits to pass a domestic cost-benefit test, regardless of how other countries respond, but these reductions will not aggregate to anything close to what is needed to prevent dangerous climate change. The Intergovernmental Panel on Climate Change’s Fifth Assessment Report, for instance, estimates that adoption of the *most cost-effective* policies to keep atmospheric CO_{2e} concentrations at or below 450 parts per million would reduce global consumption growth by 0.06% per year, leading to a fall below trend consumption of 1.7% by 2030, 3.4% by 2050, and 4.8% by 2100.³³

There is substantial uncertainty in these estimates, in large part because they depend on assumptions regarding technological development.³⁴ But it would be unwise to simply hope that technological breakthroughs will prove an adequate substitute for a robust policy regime. If anything, the political challenges associated with adopting the most cost-effective policies like carbon pricing suggest that actual costs are likely to be higher. While these costs are certainly manageable and worth bearing given the costs and risks associated with climate change, they are substantial enough that getting countries to bear them will be a significant geopolitical challenge. In order to justify deep emissions reductions, the

²⁹ *Id.* at 4.

³⁰ LIAM O’FLAHERTY, UNIV. COLL. LONDON: GLOB. GOVERNANCE INST., THE GLOBAL GOVERNANCE OF CLIMATE CHANGE 4 (2015), <https://www.ucl.ac.uk/global-governance/downloads/policybriefs/climatechangebrief> [<https://perma.cc/HRY3-2B2Z>].

³¹ Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENVTL. L. REV. 1, 17–19 (2007).

³² Stephen J. DeCanio & Anders Fremstad, *Game theory and climate diplomacy*, 85 ECOLOGICAL ECON. 177, 179 (2011).

³³ IPCC SUMMARY FOR POLICYMAKERS, *supra* note 20, at 15–16.

³⁴ *Id.* at 6.

impact of those emissions on other countries must be factored, directly or indirectly, into the decision-making process. The theory of pledge and review is that moral pressure, reputational incentives, and global public opinion will be sufficient to motivate action. There is no precedent for such forces inducing countries to bear the sort of large economic burden that deep climate change mitigation calls for.

Against this skeptical view, advocates of the pledge and review approach can surely claim that it has been more successful than anything else we have tried, and that the Paris Agreement it produced is a big step toward putting the world on a path that will eventually lead to deep enough emissions reductions to avoid dangerous climate change. Although the emissions commitments through 2030 do not adhere to the most cost effective path to climate stabilization, they represent a political breakthrough and an important step toward the stabilization goal. Commitments for 2030 can still be improved upon in interim reviews and will create momentum for steeper reductions in subsequent commitment periods.³⁵ Indeed, Article 3(4) of the Paris Agreement requires that every five years, “each Party’s successive nationally determined contribution will represent a progression beyond the Party’s then current nationally determined contribution and reflect its highest possible ambition.”³⁶ Extrapolating out from the NDCs embodied in the Paris agreement to model temperature change also assumes no further breakthroughs in the international negotiations. All such analysis shows is that the Paris Agreement did not entirely solve the climate mitigation problem, but this is an unfair standard because it was never realistic to expect the problem to be solved in one giant leap. If the theory behind pledge and review is sound, we would expect to see, over time, that the projections based on successive rounds of pledges will bring us closer to the temperature goal of the Paris Agreement.³⁷

There are a few problems with this more optimistic analysis. First, the current NDCs embodied in the Paris Agreement could just as easily be viewed as a best case scenario for emissions, since there is no enforcement mechanism to ensure that countries meet their targets. Indeed, early evidence suggests that developing countries are falling

³⁵ KITOUS & KERAMIDAS, *supra* note 17, at 4.

³⁶ Paris Agreement art. 4, ¶ 3, Dec. 12, 2015, U.N. Doc. FCCC/CP/2015/Add.1, http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf [<https://perma.cc/P8L2-B745>].

³⁷ Based on email correspondence with Joseph Siegel, Senior Attorney in EPA Region 2 and Adjunct Professor at Pace University’s Elizabeth Haub School of Law, on file with author.

short of their Paris pledges.³⁸ With the election of Donald Trump and the likely repeal of the Clean Power Plan, it already looks implausible that the United States will meet its Paris commitments.³⁹ Under Obama Administration policies, the United States “was probably only ever on track to cut its emissions by 15–19%” below 2005 levels by 2025, well short of the 26–28% pledge.⁴⁰ The June 2017 announcement of U.S. withdrawal from the Paris Agreement casts further doubt on its viability. Moreover, as the low-hanging fruit of cheap⁴¹ emissions reductions are plucked between now and 2030, further reductions will require more costly tradeoffs, at least in the absence of significant technological breakthroughs.⁴² It is unrealistic to expect that all or nearly all significant emitters will be prepared to make significant economic sacrifices on the sole basis of concern for the welfare of non-citizens or their reputations as positive contributors to the international system. Evidence from other domains of international affairs strongly suggests that nations act primarily in their own interests and that global interests are only served when the incentive structure facing states compels it.⁴³ Foreign aid, for example, represents a relatively small fraction of government budgets and much of it is designed to serve security interests or other objectives that ultimately benefit domestic citizens.⁴⁴ Likewise, immigration and trade policy decisions typically place little to no weight on the interests

³⁸ David G. Victor et al., Comment, *Prove Paris was more than paper promises*, 548 NATURE 25, 26 (2017), https://www.nature.com/polopoly_fs/1.22378!/menu/main/topColumns/topLeftColumn/pdf/548025a.pdf [<https://perma.cc/X67D-KECE>].

³⁹ Emily Atkin, *The Paris Agreement Is Burning*, NEW REPUBLIC (Mar. 28, 2017), <https://newrepublic.com/article/141640/paris-agreement-burning-trump-executive-order-obama-clean-power-plan> [<https://perma.cc/C3EA-XRB4>].

⁴⁰ Victor et al., *supra* note 38, at 26.

⁴¹ “Cheap” should be read here to refer to net costs, such that moderate cost interventions that produce significant local co-benefits qualify. The existence of local co-benefits is often raised as a counter to the fundamental incentive logic of atmospheric commons. These co-benefits do allow for some margin of emissions abatement measures to pass a domestic cost-benefit analysis, but not nearly enough to meet the world’s stated climate stabilization goals. The role of international climate mitigation institutions should be to fill that gap.

⁴² Victor et al., *supra* note 38, at 26.

⁴³ JOSHUA S. GOLDSTEIN & JON C. PEVEHOUSE, INTERNATIONAL RELATIONS 4–9 (Pearson 8th ed. 2008), available at <http://www.joshuagoldstein.com/jgcore.htm> [<https://perma.cc/54MQ-YRPS>].

⁴⁴ See OECD, *Net Official Development Assistance From DAC and Other Donors in 2014* (Apr. 8, 2015), <http://www.oecd.org/dac/stats/documentupload/ODA%202014%20Tables%20and%20Charts.pdf> [<https://perma.cc/5TBU-7EZZ>]; CURT TARNOFF & LARRY NOWELS, CONG. RESEARCH SERV., ORDER CODE 98-916, FOREIGN AID: AN INTRODUCTORY OVERVIEW OF U.S. PROGRAMS AND POLICY 1–3 (2005).

of foreigners. In fact, George Mason University economist Bryan Caplan argues that voters' systematic "tendency to underestimate the economic benefits of interaction with foreigners" leads democracies to adopt trade and immigration policies that are less open and cooperative than an unbiased optimization of domestic interests would produce.⁴⁵

The international trade system works, to the extent that it does, because countries that do not participate constructively are the primary malificariaries of their actions. Other countries lose out a little bit from having one fewer trading partner, but the economically isolated country suffers much more. In fact, economic theory suggests that unilateral lowering of trade barriers would produce net benefits for most countries that adopt it.⁴⁶ The primary barrier to free trade is domestic politics, where the concentrated interests of producers who benefit from tariffs and other forms of protectionism are better organized than the diffuse interests of consumers who would benefit from the lower prices generated by international competition. Free trade agreements and the World Trade Organization overcome these obstacles by enabling coordination of reciprocal lowering of trade barriers, which creates concentrated constituencies for free trade in the form of domestic industries that would benefit from access to foreign markets.⁴⁷

The dynamic for climate policymakers is much more challenging. A lone defector from a robust and aggressive global GHG emissions reductions effort would get to enjoy the same climate change mitigation benefits as all the participating countries, while bearing none of the costs. Defectors might even get extra benefits from cheap access to fossil fuels that others are phasing out or a competitive edge in energy intensive export industries. Countries do not need to be coerced into participating in the global trade system, because they are the primary beneficiaries of their own openness. No analogous automatic reward system, beyond goodwill and reputational benefits, exists to encourage robust participation in climate change mitigation, at least not beyond the level justified by co-benefits of GHG emissions abatements measures or by domestic climate change impacts attributable to domestic emissions. The challenge for climate policymakers is to craft a set of instruments and institutions that

⁴⁵ BRYAN CAPLAN, *THE MYTH OF THE RATIONAL VOTER: WHY DEMOCRACIES CHOOSE BAD POLICIES* 36–39 (Princeton U. Press 2007).

⁴⁶ Paul Krugman, *What Should Trade Negotiators Negotiate About?*, 35 J. OF ECON. LIT. 113, 113 (1997).

⁴⁷ *Id.* at 119–20.

will shape an incentive structure that is compatible with the deep GHG emissions reductions needed to avoid dangerous climate change.

III. ALTERNATIVES AND SUPPLEMENTS TO PLEDGE AND REVIEW

The remainder of this Article discusses four potential mechanisms for introducing these incentives into the climate mitigation regime. Each mechanism presents significant hurdles and drawbacks, but all must be given serious consideration in light of the importance of achieving sufficient global coordination on climate change mitigation and the dim prospects for doing so within the current paradigm. First, I consider strategic emissions abatement policies, including explicitly conditioning emissions commitments on the emissions of other countries and various emissions abatement coalition arrangements. Second, I discuss linkage of climate change mitigation with other geopolitical issues, with a particularly emphasis on trade. Third, I describe a globally harmonized carbon price regime, with design features and transfer payments used to induce reluctant countries to participate. Finally, I analyze the potential for relaxation of national sovereignty in the climate change mitigation domain in favor of a sovereign global climate authority empowered to enforce emissions regulations.

A. *Strategic Emissions Abatement Policies*

One option, pushing the analogy with trade to its limit, would be for countries to explicitly condition their emissions reduction pledges on the emissions of others, ramping up their own mitigation efforts in reciprocity with others' efforts. One proposal along these lines is for a *strategic* social cost of carbon ("SCC"), distinct from domestic and global conceptions of the SCC.⁴⁸ Using the SCC or a carbon price as the benchmark has two advantages over traditional approaches based on national aggregate emissions targets. First, it offers a neutral principle for determining the level of climate mitigation effort each country should undertake and acts as a transparent metric, reducing the scope for special pleading with regard to circumstances and capacities. Transfer payments or other concessions could still be used to compensate countries with especially

⁴⁸ The social cost of carbon is a monetized present value estimate of the long-term harm produced by a ton of carbon dioxide. It is used to estimate the benefits of emissions reductions policies in regulatory cost-benefit analysis.

high mitigation costs and/or low vulnerability to climate impacts, or to address moral culpability for unequal contributions to the existing stock of GHGs in the atmosphere. Second, a uniform global SCC or carbon price would help ensure that the most cost effective emissions abatement measures are undertaken first, regardless of their geographic location or legal jurisdiction. If it is more cost effective to invest in clean infrastructure from the start in developing countries than to replace existing dirty infrastructure in industrialized countries, for instance, then those investments should be prioritized. Ideally, the question of which abatement measures to undertake could be separated from the issue of who bears the costs of implementing them.

Yale environmental economist Matthew Kotchen introduces the strategic SCC concept and develops a game theory model where strategic carbon emissions behavior depends upon assumptions regarding the response of other countries to domestic emissions reductions.⁴⁹ Under certain assumptions and conditions, he shows that it can be individually rational for countries to internalize the global SCC.⁵⁰ Unfortunately, Kotchen ends up defining strategic SCC in terms of the “level of global ambition each country would like to see through a uniformly applied marginal cost on emissions,” in effect assuming away most of the key strategic problems and focusing only on differences in vulnerability to climate impacts.⁵¹ He finds that the strategic SCC, so defined, will always be higher than the domestic SCC and can be higher or lower than the global SCC, depending on the relative vulnerability of the country to the impacts of climate change.⁵² Highly vulnerable countries may have strategic SCC above the global SCC, since it is in their interest to nudge the global carbon price toward a higher equilibrium closer to a level that maximizes their net benefits. Less vulnerable countries, by contrast, will prefer an equilibrium where the global carbon price rests below the global SCC.

Kotchen implicitly justifies this approach based on his demonstration that SCC set above their domestic values are present in subgame perfect equilibria in repeated games with infinite or uncertain duration, but he fails to demonstrate that any one country’s adoption of a higher SCC will succeed in nudging the world to higher SCC equilibrium. Indeed,

⁴⁹ Matthew J. Kotchen, *Which Social Cost of Carbon? A Theoretical Perspective* 1 (Nat’l Bureau of Econ. Res., Working Paper No. 22246, 2016), <http://papers.nber.org/tmp/45831-w22246.pdf> [<https://perma.cc/D266-JYNT>].

⁵⁰ *Id.* at 14.

⁵¹ *Id.* at 19.

⁵² *Id.* at 20.

in the context of non-repeated games, he acknowledges that results where countries adopt SCC above their domestic values depend on contested conjectural assumptions regarding responses to one country increasing its SCC value.⁵³ In fact, some game theory models find that greater emissions reductions by one country will induce others to raise their emissions by lowering the marginal damage induced by those emissions.⁵⁴ Scholarly analyses of carbon leakage also discuss a potential *slacking-off* effect, where the perception or reality that other jurisdictions are adopting strong measures to reduce emissions could reduce the sense of urgency on climate action for other parties.⁵⁵ To Kotchen's credit, he does offer some reason to think that the pure, non-repeated game Nash behavior embodied in these models is unrealistic and also does not claim that the models he presents are necessarily the correct ones.⁵⁶ Nonetheless, his failure to incorporate the key strategic elements of climate change mitigation into his conception of the strategic SCC limits the utility of his approach.

A more robust conception of the strategic SCC would be sensitive to the actual patterns of international response to changes in domestic climate policy. It would also allow explicitly and publicly conditioning the SCC value used on the emissions behavior of other countries. After all, the models where equilibria with SCC set above domestic levels are stable depend on the threat of retaliation for defection, among other features. Accordingly, a SCC that is insensitive to the emissions behavior of other countries would undermine strategic leverage. Linking the SCC or carbon price to the emissions policies adopted by other jurisdictions would also address the objection of domestic opponents of GHG emissions abatement measures in the United States: that unilateral action will have negligible impact on the global climate and so does not pass a cost-benefit test.⁵⁷ Unfortunately, even if many countries implemented a conditional SCC strategy, there remains a similar commons problem to

⁵³ *Id.* at 15.

⁵⁴ Peter John Wood, *Climate Change and Game Theory* 8 (Envtl. Econ. Res. Hub, Res. Report No. 62, 2010), <http://ageconsearch.umn.edu/bitstream/95061/2/Climate%20Change%20and%20Game%20Theory.pdf> [<https://perma.cc/8LVL-T9ZJ>].

⁵⁵ Daniel A. Farber, *Carbon Leakage Versus Policy Diffusion: The Perils and Promise of Subglobal Climate Action*, 13 CHI. J. INT'L. L. 359, 373 (2013).

⁵⁶ Kotchen, *supra* note 49, at 15.

⁵⁷ See Jerry Taylor, *Debating Carbon Taxes with Oren Cass (and Bill Gates)*, NISKANEN CTR. (Apr. 19, 2017), <https://niskanencenter.org/blog/debating-carbon-taxes-oren-cass-bill-gates/> [<https://perma.cc/9ZHB-VG8F>].

the original situation. SCC value adjustments made to punish or reward GHG emissions policy actions by other governments will impose similar consequences on all countries, regardless of their own emissions policies.⁵⁸ When considering how much to invest in mitigation, these countries will have some incentive to consider the impact of their emissions on the emissions of countries that adopt conditional emissions policies. However, given the large number of countries with significant GHG emissions, the sensitivity of conditional emissions policies to emissions behavior of any one country will be limited. Conditional emissions policies may have their greatest impact on the behavior of large emitters like the United States and China, whose own policy changes would have outsized impact on conditional emissions response functions. Of course, the greater potential emissions reductions in the United States and China also correlate to higher aggregate costs for greater policy ambition (e.g., higher SCC or carbon price), so the scaled-up incentives may still fail to shift domestic cost-benefit analyses significantly. Frequent adjustments in SCC values or carbon prices in response to the emissions behavior of others may also render mitigation policies less economically efficient. There is some risk with any conditional emissions abatement policies that the additional emissions reductions induced in other countries will be insufficient to offset any reduction in ambition by the countries who establish and execute conditional emissions policies. Nonetheless, this approach is worthy of consideration as part of a broader effort to align mitigation incentives.

One proposal to increase the strategic leverage of conditional abatement policies is to form a top-down grand coalition where all countries adopt a globally optimal SCC if and only if all other countries join the coalition.⁵⁹ If any country defects, the coalition dissolves and all countries revert to their domestic SCC. If the commitment to dissolve the coalition in response to a single defection is credible, this structure can be shown to produce optimal emissions reductions given otherwise reasonable assumptions. Unfortunately, there is reason to doubt the credibility of such an approach, since most of the cost of dissolving the coalition would fall on members rather than the initial defector.⁶⁰ It is also vulnerable to being undone by the defection of an irrational actor or one that does not recognize the anticipated costs associated with climate change. Do we

⁵⁸ The consequences will not be exactly the same because of differential vulnerabilities to climate change, but the key point is that the impacts will not be targeted in any systematic way on to the countries that are being “punished” for their own lax emissions standards.

⁵⁹ Wood, *supra* note 54, at 20–21.

⁶⁰ *Id.* at 21.

really want the success of climate mitigation to depend on the full cooperation of North Korea or the Trump Administration? Moreover, any exceptions to the dissolution commitment that are allowed in order to address this problem risk further undermining the credibility of the commitment.

Intermediate approaches based on bottom-up coalitions are also possible. If several countries agree to adopt SCC that maximize their joint welfare, the coalition's optimal SCC will rise in proportion to the share of global emissions contained within the coalition.⁶¹ As the coalition expands to include all countries, the coalition's optimal SCC approaches the global SCC. Unfortunately, both theoretical models and empirical results indicate that bottom-up coalitions for the provision of global public goods tend to be small, unstable, and fragile, at least absent external enforcement mechanisms. The problem is that as more countries join, the optimal SCC for the group rises and diverges further from the domestic SCC of its members. This increases the incentive for individual members to defect and free-ride off the efforts of remaining coalition members. This defection would marginally reduce optimal SCC for those remaining, but at sufficiently large coalition size this will not produce defection costs larger than the benefits of reverting to the defector's domestic SCC.⁶² The size of sustainable coalitions depends on the structure of mitigation costs and anticipated climate impacts as well as the total number of countries, but the general result is that only in relatively small coalitions can self-enforcement be robust.⁶³

Despite these limitations, strategic leveraging of domestic mitigation policy can provide some added incentive for other countries to adopt and follow through on more aggressive mitigation measures. In this regard, the intransigence of the United States Congress has been particularly unhelpful, since it has limited U.S. federal climate mitigation policy largely to executive actions under the Clean Air Act that lack the flexibility necessary to be used as a tool to induce other countries to reduce their emissions. This is particularly frustrating given that one of the stated objections of Republican opponents of climate change mitigation legislation is that U.S. action, absent similar contributions from China and other developing countries, would impose economic harm for little benefit.⁶⁴ Adopting a SCC or carbon price index to a basket of

⁶¹ William Nordhaus, *Climate Clubs: Overcoming Free-riding in International Climate Policy*, 105 AM. ECON. REV. 1339, 1345 (2015).

⁶² *Id.*

⁶³ *Id.*

⁶⁴ See Rebecca Kaplana & Ellen Uchimiyachs, *Where the 2016 Republican candidates stand*

estimates of shadow carbon prices in other jurisdictions would address objections based on the impotence of unilateral emissions abatement, while providing other jurisdictions with some incentive to increase the stringency of their own policies. By limiting the executive branch to the tools available under the Clean Air Act and other statutes that were not drafted with climate change mitigation in mind, Congress exacerbates this problem, in addition to preventing the use of more economically efficient emissions reduction policies like carbon pricing.

B. Issue Linkage

The limitations of coalition formation absent external enforcement measures suggests the necessity of linking climate change mitigation with other geopolitical issues, potentially including trade, collective security arrangements, arms sales, access to research and development, immigration, and foreign aid. This approach allows the option of targeting particular countries with incentives that are directly responsive to their own behavior. Trade is the most promising candidate for linkage and the primary focus of this section. Subsection 1 examines William Nordhaus's proposal for a "climate club" model for trade linkage. Subsection 2 considers the potential role of carbon tariffs or border tax adjustments for imports of energy intensive goods. Subsection 3 analyzes the legality of trade linkage under the General Agreement on Tariffs and Trade and under World Trade Organization jurisprudence. Subsection 4 explores the potential for more generally integrating climate change mitigation into diplomatic relations, using a range of other policy domains as potential carrots and sticks to motivate ambitious GHG emissions abatement measures. Finally, subsection 5 discusses the risks and limitations of issue linkage.

1. Climate Club

Yale environmental economist William Nordhaus characterizes trade-linking as "the only serious candidate" for introducing enforcement mechanisms to climate agreements, proposing formation of a "climate club" of countries that agree to adopt a minimum domestic carbon price and impose tariffs on countries that do not participate.⁶⁵ Use of a carbon

on climate change, CBS NEWS (Sept. 1, 2015), <http://www.cbsnews.com/news/where-the-2016-republican-candidates-stand-on-climate-change/> [<https://perma.cc/8FHN-WJ3L>].

⁶⁵ WILLIAM NORDHAUS, *THE CLIMATE CASINO: RISK, UNCERTAINTY, AND ECONOMICS FOR A WARMING WORLD* 255 (Yale U. Press 2013).

price requirement as opposed to an emissions limit allows for a single-dimensional metric of ambition. Nordhaus argues that this will make the coalition more stable by reducing the risk of “stab-in-the-back” instability, where coalition members or subgroups hold out or defect in hopes of garnering more favorable terms.⁶⁶ He does not address the possibility that the requirement that all participants adopt carbon pricing might threaten the domestic political viability of the approach in some countries, including the United States. Domestic political resistance to carbon pricing could prove an insurmountable obstacle to successful adoption of Nordhaus’s approach. One way of addressing this could be to allow substitution of a *shadow* carbon price in the form of a pervasive regulatory regime based on a SCC.⁶⁷ Whether a given SCC value for regulatory analysis can be feasibly and verifiably made equivalent to a carbon price is an open question and beyond the scope of this paper.

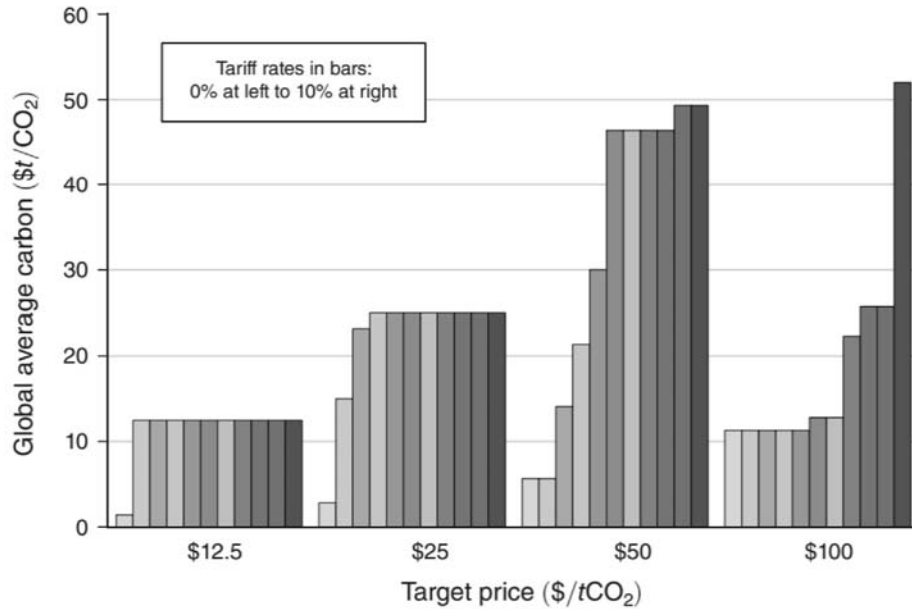
Nordhaus describes two different approaches to trade-linking: a uniform tariff on all imports from non-club countries or a border tax adjustment based on the carbon content of imports, also known as a carbon tariff, that imposes the agreed upon minimum carbon price. While the border tax adjustment approach has received more scholarly attention, Nordhaus favors a uniform tariff as a simpler and more transparent approach. He points out that most GHG emissions come from non-tradable sectors like power plants and transportation, which would not be affected by a border tax adjustment.⁶⁸ Accordingly, the function of trade-linking should be to provide inducements to adopt more robust emissions reductions policies, rather than directly targeting trade in carbon-intensive goods.

⁶⁶ Nordhaus, *supra* note 61, at 1347.

⁶⁷ WORLD BANK, *Pricing Carbon: What is Carbon Pricing* (Jan. 17, 2017), <http://www.worldbank.org/en/programs/pricing-carbon> [<https://perma.cc/PS3A-T996>].

⁶⁸ Nordhaus, *supra* note 61, at 1348.

Nordhaus develops a model with 15 regions, simulating outcomes for target carbon prices (global SCC) ranging from \$12.5 to \$100/tCO₂. The results are presented in the table below⁶⁹:



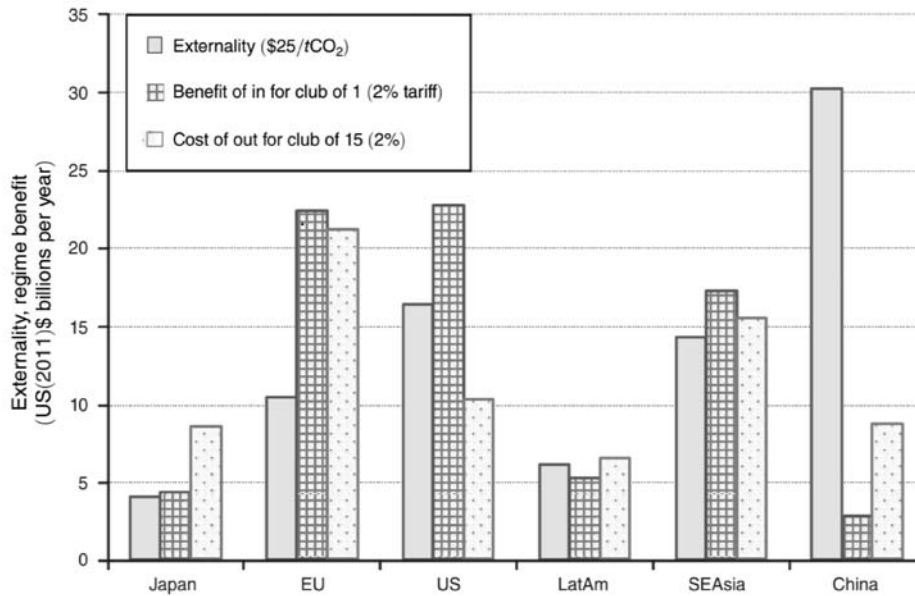
At \$12.5/tCO₂, a 1% tariff is sufficient to induce full participation in the club. At \$25/tCO₂, a 2% tariff induces 14 of 15 regions to participate, with a 3% tariff needed to attain full participation. At \$50/tCO₂, a 5% tariff achieves near-total cooperation. At \$100/tCO₂, a 10% tariff is needed to induce even half the regions to join the club.⁷⁰ Effectively, this means that a carbon club is unlikely to be able to sustain a carbon price much above \$50/tCO₂. In Nordhaus's model, a \$12.5/tCO₂ carbon price with full participation reduces emissions by 9% below baseline, rising to 18%, 36%, and 72% at \$25, \$50, and \$100/tCO₂, respectively, assuming static technology.⁷¹ This indicates that substantial technological progress would be necessary to bring marginal abatement costs down enough for the level of carbon prices sustainable under a climate club to achieve the needed emissions reductions.

⁶⁹ *Id.*

⁷⁰ *Id.* at 1357–58.

⁷¹ *Id.* at 1358.

There is also reason to think that Nordhaus's model presents an optimistic scenario. First, Nordhaus's model relies on the assumption that club members *benefit* directly from the tariffs they impose on non-members. For instance, his model assumes that United States would garner \$23 billion in net benefits from imposing a 2% tariff on all imports.⁷² The table below displays these benefits, as well as the magnitude of the climate externality (global SCC minus domestic SCC), and the costs of being the sole non-participant for a global SCC of 25/tCO₂ and 2% tariff for 6 of the 15 countries/regions he models⁷³:



In assuming these benefits to tariff-imposing countries, Nordhaus relies on the theory of optimal tariffs, under which large economies with market power can benefit from the imposition of fees on imports and exports that enable them to achieve more favorable terms of trade.⁷⁴ In the appendix to his Climate Club paper, he discusses a model developed by Ralph Ossa that estimates optimal tariff rates and finds a central

⁷² *Id.* at 1350.

⁷³ *Id.*

⁷⁴ *Id.* at 1353.

estimate of 60%, well in excess of the tariff rates his proposal entails.⁷⁵ However, these results are controversial, with some prominent economists dismissing optimal tariff theory as “little more than an intellectual curiosity with no practical value in all but the largest countries.”⁷⁶ This relates to the other main reason to be skeptical of the output of Nordhaus’s model, that he consolidates the world into 15 countries and regional blocs instead of 193 countries. In optimal tariff theory, small countries lack the market power to substantially improve their terms of trade by imposing tariffs. Moreover, the basic dynamics of coalition formation for the provision of public goods become more challenging as the number of countries rises, suggesting that real-world results would underperform relative to the Nordhaus model.⁷⁷ There is also evidence that existing tariff rates already take advantage of the best opportunities to exercise market power, setting higher tariff rates for goods that are supplied inelastically.⁷⁸ This suggests that there may be limited scope for further exercise of market power, on which Nordhaus’s case rests. It is also worth noting that optimal tariff theory implies corresponding terms of trade benefits from *taxing* exports.⁷⁹ While the domestic politics of this would be challenging, there would be greater scope for implementing this policy under existing international trade law.

The assumption of net benefits to tariff-imposing countries is particularly critical to Nordhaus’s model because that is what renders the trade sanctions incentive compatible. If instead trade sanctions were costly to the imposing countries as well as the sanctioned countries, as is typical with the more severe economic sanctions used in coercive diplomacy, the entire structure would be at greater risk of unraveling. Optimal tariff theory also relies on holding the tariff policies of other countries constant. If punitive tariffs imposed by members of a climate club set off a trade war, this would quickly wipe out any benefits from improved terms of trade and make all countries worse off. To his credit, Nordhaus does acknowledge the need for changes to international trade law to accommodate his proposal.⁸⁰ Even if the carbon club countries

⁷⁵ WILLIAM NORDHAUS, ONLINE APPENDIX TO “THE CLIMATE CLUB: DESIGNING A MECHANISM TO OVERCOME FREE RIDING IN INTERNATIONAL CLIMATE POLICY” 6–7 (2015).

⁷⁶ Christian Broda et al., *Optimal Tariffs: The Evidence* 1 (Nat’l Bureau of Econ. Res Working Paper No. 12033, 2006) (citing PAUL R. KRUGMAN & MAURICE OBSTFELD, INTERNATIONAL ECONOMICS: THEORY AND POLICY 225, 245 (Addison-Wesley 4th ed. 1997)).

⁷⁷ Nordhaus, *supra* note 61, at 1352.

⁷⁸ Broda et al., *supra* note 76, at 1.

⁷⁹ KRUGMAN & OBSTFELD, *supra* note 76, at 225.

⁸⁰ Nordhaus, *supra* note 61, at 1349.

could be confident that international trade law backed up their right to impose punitive tariffs on outliers, however, the risk of rebellion against World Trade Organization (“WTO”) rules by those outliers would have to be factored into the expected benefits calculation for each club member, potentially turning that value negative for marginal members.

Nonetheless, Nordhaus’s work does suggest that across-the-board tariffs implemented through a climate club structure could be a powerful tool for promoting cooperation on relatively aggressive climate change mitigation measures. Other game theory models also support the basic finding that trade sanctions can increase participation in a climate treaty.⁸¹ Even though there is a clear limit, around a carbon price of \$50/ton, to the level of effort this approach can enforce, it would put the world in a position where it is realistic that technological advances will help deliver steep enough emissions reductions to stabilize atmospheric GHG concentrations and temperatures at tolerable levels. It would be a significant blow to the framework if tariffs imposed by a club member do not produce the projected domestic benefits, but it is still possible a critical mass of motivated countries could get the project off the ground. Doing so would rely on a certain amount of domestic sacrifice for the sake of tackling a global problem, but not nearly to the same extent as the current pledge and review paradigm.

2. Carbon Tariffs or Border Tax Adjustments

As Nordhaus points out, tariffs on the carbon content of imported goods are typically proposed as measures to address leakage and competitiveness concerns. While the theoretical case for leakage is solid, estimates of its magnitude tend to be modest, with about 10% of emissions reductions being offset by induced emissions elsewhere.⁸² Moreover, border tax adjustments would only address trade-based leakage that occurs when production of energy intensive manufactured goods is relocated,

⁸¹ Scott Barrett, *The Strategy of Trade Sanctions in International Environmental Agreements*, 19 RES. & ENER. ECON. 345, 345 (1997); Kai Lessmann et al., *The effects of tariffs on coalition formation in a dynamic global warming game*, 26 ECON. MOD. 641, 647 (2009).

⁸² Sallie James, *A Harsh Climate for Trade: How Climate Change Proposals Threaten Global Commerce* 3 (Cato Inst., Trade Policy Analysis No. 41, 2009); Sergey v. Paltsev, *The Kyoto Protocol: Regional and Sectoral Contributions to the Carbon Leakage*, 44 ENERGY J. 53, 53 (2001); WARWICK J. MCKIBBIN ET AL., EMISSIONS TRADING, CAPITAL FLOWS AND THE KYOTO PROTOCOL 18 (Brookings Institution 1999); IPCC, CLIMATE CHANGE 2001: MITIGATION: SUMMARY FOR POLICYMAKERS 11 (2001).

not consumption-based leakage in non-tradable sectors like grid electricity and transportation. Unless accompanied by subsidies for energy intensive exports, carbon tariffs also fail to address leakage associated with reduced manufacturing exports. For these reasons, the Environmental Protection Agency estimates indicate that border tax adjustments would reduce the increase in foreign emissions from unilateral emissions policies by less than 5%.⁸³ This means that border tax adjustments would only reduce foreign emissions by about one ton for every two hundred tons of domestic emissions avoided by the underlying emissions policy.⁸⁴

Nonetheless, border tax adjustments are worth exploring for two reasons. First, they are more likely to pass muster under current WTO law than across-the-board tariffs. Second, they may make stronger emissions reductions measures politically viable by mollifying domestic manufacturers of energy-intensive tradable goods. Indeed, despite the rhetorical nods to combating leakage, border tax adjustments are projected to be far more successful at maintaining domestic manufacturing output than at reducing emissions.⁸⁵ To understand why this is, it's important to recognize that what a border tax adjustment does is partially shift emissions regulation from domestic production to domestic consumption. This is easiest to see with an economy-wide carbon price. If all imports are charged a border fee that matches the taxes or allowance fees that would have been paid if produced domestically, then all domestic consumption is on equal footing. Completing the shift from supply- to demand-side regulation would entail refunding any carbon fees for exports, so domestic exporters would be on the same level as

⁸³ EPA, EPA ANALYSIS OF THE LIEBERMAN-WARNER CLIMATE SECURITY ACT OF 2008: S. 2191 IN 110TH CONGRESS 84 (Mar. 14, 2008), https://archive.epa.gov/epa/sites/production/files/2016-07/documents/s2191_epa_analysis.pdf [<https://perma.cc/Z7P3-RLZ6>].

⁸⁴ For a more in-depth discussion of emissions leakage and proposed countermeasures, see Gabriel Weil, *Costs, Contributions, and Climate Change: How Important Are Universal Emissions Commitments?*, 23 GEO. INT'L ENVTL. L. REV. 321 (2011).

⁸⁵ Paul-Erik Veel, *Carbon Tariffs and the WTO: An Evaluation of Feasible Policies*, 12 J. INT'L ECON. L. 749, 751–52 (2009); Michael McKenzie, *Climate Change and the Generalized System of Preferences*, 11 J. INT'L ECON. L. 679, 681 (2008); Carolyn Fischer & Alan K. Fox, *Comparing Policies to Combat Emissions Leakage: Border Tax Adjustments versus Rebates*, RES. FOR THE FUTURE 21–22 (2009), <http://www.rff.org/RFF/Documents/RFF-DP-09-02.pdf> [<https://perma.cc/74MH-BKEJ>]; Bernd G. Janzen, *International Trade Law and the “Carbon Leakage” Problem: Are Unilateral U.S. Import Restrictions the Solution?*, 8 SUSTAINABLE DEV. L. & POLICY 22, 26 (2008); TREVOR HOUSER ET AL., PETERSON INST. FOR INT'L ECON. & WORLD RES. INST., LEVELING THE CARBON PLAYING FIELD: INTERNATIONAL COMPETITION AND US CLIMATE POLICY DESIGN xvi (2008), http://pdf.wri.org/leveling_the_carbon_playing_field.pdf [<https://perma.cc/6W75-JJ52>].

other suppliers to foreign markets. There is sound economic rationale for doing this, since it removes the distortion to comparative advantage introduced by different levels of GHG emissions regulation, making it more likely that production will be located based on genuine comparative advantage.⁸⁶ All else being equal, economic theory indicates that this maximizes gains from trade and the overall efficiency of the global economy. Note, however, that this high-minded rationale may not be what drives policymakers to adopt border measures; they are often driven by more mercantilist conceptions of competitiveness.⁸⁷ Indeed, the U.S. Senate's refusal to ratify the Kyoto Protocol was largely based on concerns regarding the agreement's impact on the competitiveness of American manufacturers vis-à-vis those in developing countries that were not subjected to emissions limits under the agreement.⁸⁸

The drawbacks of this approach remain significant. First, as Nordhaus argues, border tax adjustments that seek to track the carbon emissions embedded in imports would be an immense administrative challenge. Unless categories of products are simply presumed to have a specified carbon content, which would undermine any incentive for manufacturers to reduce their emissions, the manufacturing process and energy sources would have to be tracked and verified. Also, if the tax adjustment is limited by the domestic carbon price or SCC embedded in emissions regulations, it gives foreign governments little incentive to adopt their own regulations. Their domestic manufacturers are no worse off when exporting to countries with a border tax adjustment, and better off when producing for the domestic market and other export markets compared to scenarios where the government adopts an equivalent carbon price or regulatory regime. Border tax adjustments that exceed the domestic carbon price or SCC would lack a compelling policy rationale and likely forfeit any advantage over an across-the-board tariff under international trade law. So, border tax adjustments are weak strategic levers that are unlikely to move the needle much with regard to the geopolitics of climate change mitigation. However, they could play an important role in making domestic climate regulation more viable; they have a fairly solid economic rationale; and they stand a greater chance of surviving a WTO challenge than alternative forms of trade linkage.

⁸⁶ Veel, *supra* note 85, at 752.

⁸⁷ *Id.* at 753.

⁸⁸ *Id.* at 753–54.

3. International Trade Law

One potential obstacle to linking trade policy with climate change mitigation is that most countries are constrained by their obligations under the General Agreement on Tariffs and Trade (“GATT”) and World Trade Organization (“WTO”) system. GATT Article I establishes the most-favored nation (“MFN”) principle, under which like products imported from any contracting party must be given equal treatment.⁸⁹ GATT Article II sets maximum tariff schedules. Most developed country tariffs are at or near their GATT ceilings. Developing countries tend to have more capacity to raise tariffs, with current rates further below their ceilings, but they are less likely to initiate linkage between climate mitigation and trade policy.⁹⁰ GATT Article III establishes the principle of national treatment, prohibiting discrimination between domestic and imported goods with respect to internal taxation and regulation.⁹¹ Any measures that violate the MFN or national treatment principles or that impose tariffs that exceed their GATT Article II schedules must be justified under an express exception. These include anti-dumping and countervailing duties authorized under GATT Article VI, and the ten “general exceptions” of GATT Article XX.

a. Trade Measures Consistent with GATT Articles I, II, and III

The most straightforward way for trade linkage measures to satisfy existing international trade law would be to craft them so as to avoid violating the principles of MFN and national treatment and imposing tariffs that exceed Article II limits. The threshold question for determining whether a border tax adjustment addressing carbon emissions could satisfy these requirements is whether it would be deemed a border duty on imports or an internal tax.⁹² As clarified by the WTO Appellate Body in *China—Auto Parts*, border duties apply by virtue of the event of importation, whereas internal taxes are triggered by an internal factor, taking place within the customs territory.⁹³ To be considered an internal

⁸⁹ General Agreement on Tariffs and Trade, Oct. 30, 1947, Art. I, 55 U.N.T.S. 194 [hereinafter GATT].

⁹⁰ Joost Pauwelyn, *Carbon Leakage Measures and Border Tax Adjustments under WTO*, in RES. HANDBOOK ON ENV'T, HEALTH & THE WTO 16 (G. Van Calster & D. Prévost eds., 2013).

⁹¹ GATT, *supra* note 89, at Art. III.

⁹² Pauwelyn, *supra* note 90, at 24.

⁹³ Appellate Body Report, *China—Measures Affecting Imports of Automobile Parts*, ¶ 158, WTO Doc. WT/DS339,340,342/AB/R (adopted Aug. 31, 2009).

tax, a carbon tax would need to be structured so as to be triggered by an act of sale, offer for sale, distribution, or use of the imported product after clearing customs. This would not, however, prohibit *collection* of internal taxes at the moment of importation, so long as the legal trigger for the tax is an internal event.⁹⁴

Also, even if a carbon tax applied to imports were judged to be triggered “by virtue of the event of importation, GATT Article II:2(a) allows a WTO member to impose “a charge equivalent to an internal tax . . . in respect of the like domestic product or in respect of an article from which the imported product has been manufactured or produced”.⁹⁵ Such imposition is commonly referred to as a border tax adjustment. To be border adjustable under this provision, a tax must be applied to products, rather than producers.⁹⁶ This distinction maps onto that between indirect taxes like sales, value added, and excise taxes and direct taxes like payroll, income, or corporate profit taxes. It is based on the destination principle, which holds that products themselves should only be taxed in the country of consumption. This enables countries to choose their own levels of taxation while maintaining trade neutrality.⁹⁷

Under these provisions, a carbon tax applied evenly to all products of a certain description (e.g., steel, cement), regardless of the method of production, would clearly be border adjustable. However, a tax that sought to account for the method of production, including the energy intensity of the production process and the carbon intensity of the energy used, could be considered a producer tax. Such a tax would apply to inputs, like energy, that are not embodied in the final product. The 1970 GATT Working Party Report on Border Tax Adjustments did not directly address whether this sort of process tax would be border adjustable.⁹⁸ The closest precedent is a 1987 GATT panel report in *U.S.—Superfund*, under which the United States was allowed to apply a domestic tax on certain chemicals to imports for which the same chemicals were used “as materials in the manufacture or production.”⁹⁹ The United States has also imposed a domestic tax on ozone depleting compounds and applied

⁹⁴ *Id.*

⁹⁵ GATT, *supra* note 89, at Art. II.

⁹⁶ Pauwelyn, *supra* note 90, at 26.

⁹⁷ *Id.*

⁹⁸ Panel Report, *Working Party on Border Tax Adjustments*, ¶14, WTO. Doc. L/3464 (adopted Nov. 20, 1970).

⁹⁹ Panel Report, *United States—Taxes on Petroleum and Certain Imported Substances*, ¶¶ 2.5, 5.24, WTO Doc. 34S/136 (adopted June 17, 1987).

it to imports of products containing or produced with those chemicals, but the WTO has never ruled on whether this border adjustment is permissible under GATT.¹⁰⁰

Any domestic carbon tax would likely not be imposed on final products like steel or cement, but further upstream on carbon intensive fuels or processes. Even if imposed downstream, it would at least need to be sensitive to differences in inputs and processes. To be sure, reduced steel or cement consumption due to internalization of their carbon emissions externalities is one margin on which a carbon tax would be expected to operate. However, much of the intended effect of a carbon tax would be to encourage manufacturers to employ less energy intensive production methods or rely on less carbon intensive forms of energy. A carbon tax could not achieve these effects if it were insensitive to production processes and inputs. While it is possible that the WTO Appellate Body would stretch the conception of a tax applied to products to accommodate border adjustment of a carbon tax, this outcome cannot be predicted with any confidence.

A similar analysis would apply to applications of other forms of domestic GHG emissions regulation to imports. As with taxes, domestic regulations applied to products, as opposed to producers, can generally be enforced against imports. As a practical matter, however, enforcement of GHG emissions regulations on imports is not likely to prove viable. Compare the *Tuna—Dolphin* case where the United States banned tuna caught using a method that risked killing dolphins. A GATT panel report, which was never adopted, found that this was an impermissible regulation of a process, rather than the product itself.¹⁰¹ GHG emissions regulations, like the Clean Power Plan in the United States go far deeper into regulating the production process, regulating the methods of energy generation that serve as inputs. It is hard to imagine the WTO Appellate Body deeming these regulations of products and allowing their application to imports. If the Appellate Body were willing to condone application of domestic climate regulations to imports, moreover, this could effectively result in a ban on imports from countries that do not adopt equivalent GHG emissions regulations.

Applying a domestic cap-and-trade system to imports represents an intermediate case between carbon taxes and regulations. The WTO

¹⁰⁰ Pauwelyn, *supra* note 90, at 28.

¹⁰¹ Panel Report, *United States—Restrictions on Imports of Tuna*, ¶ 5.13, WTO Doc. DS21/R, BISD 39S/155 (1991).

could conceive of the obligation to hold an emissions permit as an “internal tax or internal charge of any kind,” in which case it would be potentially border adjustable under the same analysis as a carbon tax. Alternatively, the cap-and-trade system could be treated as regulation, in which case it would encounter the same difficulties discussed above.

Finally, it is worth emphasizing the MFN and national treatment principles would clearly prohibit any differential treatment of like products based on their national origin. Even when reference to national origin is not explicit, this principle can be violated. For instance, an excise tax that Japan applied at different rates to different varieties of distilled spirits was found to violate GATT Article III's prohibition on the application of internal taxes in a manner “so as to afford protection to domestic production.”¹⁰² A tax on steel that applies different rates depending on whether coal or natural gas is used to produce it could be viewed as discriminating against steel from countries, like China, that rely primarily on coal. This would require a showing that imported products are inherently or historically reliant on, for example, fuels with higher carbon content. Even if such a showing were made, moreover, the WTO Appellate Body has tolerated internal taxes that were shown to have a “detrimental effect on a given imported product” when it could be “explained by factors or circumstances unrelated to the foreign origin of the product.”¹⁰³ It is likely that the Appellate Body would find associated carbon emissions to qualify as such a factor or circumstance.

A more significant barrier is raised, however, when the carbon emissions associated with any given import are unknown. Manufacturers may decline to disclose their production methods in sufficient detail to enable a reasonably accurate estimate of their GHG emissions. An alternative might be to rely on the predominant method of production in the importing country. This is the approach adopted by the Comprehensive Environmental Response, Compensation, and Liability Act (commonly referred to as CERCLA or Superfund). In *U.S.—Gasoline*, the Appellate Body approved of this approach, so long as the same opportunities available to domestic producers to verify practices superior to the predominant method were offered to imports.¹⁰⁴ This proviso could prove quite

¹⁰² Appellate Body Report, *Japan—Taxes on Alcoholic Beverages*, ¶4, WTO Doc. WT/DS8/AB/R, WT/DS10/AB/R, WT/DS11/AB/R (adopted Nov. 1, 1996).

¹⁰³ Appellate Body Report, *Dominican Republic—Measures Affecting the Importation and Internal Sale of Cigarettes*, ¶ 96, WTO Doc. WT/DS302/AB/R (adopted Apr. 25, 2005).

¹⁰⁴ Panel Report, *United States—Taxes on Petroleum and Certain Imported Substances*, ¶¶ 2.5, 5.2.4, WTO Doc. BISD 34S/136 (adopted June 17, 1987).

burdensome, requiring importing countries to expend significant resources in verifying the GHG emissions associated with the production processes for imports. Moreover, an approach based on the predominant method of production in the home market would undertax imports from countries where prevailing production methods are more carbon intensive. There is no precedent for relying on the predominant method of production in other countries, and it is likely that the WTO would find such an approach discriminatory. Given the low likelihood the manufacturers would submit to a verification regime that increased their tax burden, this would represent a substantial barrier to carbon taxes based on emissions rates per unit of output higher than those in the domestic market.

b. Anti-dumping Duties

GATT Article VI authorizes anti-dumping duties when “products of one country are introduced into the commerce of another country at less than the normal value of the products” and this “causes or threatens material injury to an established industry in the territory of a contracting party or materially retards the establishment of a domestic industry.”¹⁰⁵ Relying on this provision, former French Prime Minister Dominique de Villepin referred to “environmental dumping” to justify a carbon tax that would apply to imports from countries that refuse to commit to binding GHG emissions targets.¹⁰⁶ The argument is that the price of imports from those countries would not include the social cost of the carbon emitted during the production process.¹⁰⁷ Thus, any country that adopts binding GHG emissions commitments should have the right to impose extra tariffs to account for this difference. However, GATT Article VI clearly indicates that the “normal price” is to be understood as the prevailing market price of the good in the exporting country’s domestic market.¹⁰⁸ That is, the EU could only impose anti-dumping duties on Indian exports that are priced below Indian domestic prices for the same goods.¹⁰⁹ If a domestic price is unavailable, “(i) the highest comparable price for the like product for export to any third country in the ordinary course of

¹⁰⁵ GATT, *supra* note 89, at Art. VI.

¹⁰⁶ Herve Kempf, *Dominique de Villepin propose une taxe sur le CO2 des produits importes*, LE MONDE (Nov. 13, 2006), http://www.lemonde.fr/planete/article/2006/11/13/dominique-de-villepin-propose-une-tax-sur-le-co2-des-produits-importes_833826_3244.html.

¹⁰⁷ *Id.*

¹⁰⁸ GATT, *supra* note 89, at Art. VI, ¶ 1(a)–(b)(ii).

¹⁰⁹ Pauwelyn, *supra* note 90, at 17–19.

trade, or (ii) the cost of production of the product in the country of origin plus a reasonable addition for selling cost and profit” may be substituted.¹¹⁰ International differences in pricing and regulation of GHG emissions, therefore, cannot support a finding of dumping.

c. Countervailing Duties

Countervailing duties are authorized by GATT Article VI “for the purpose of offsetting any bounty or subsidy bestowed, directly, or indirectly, upon the manufacture, production or export of any merchandise.”¹¹¹ Nobel laureate economist Joseph Stiglitz has proposed justifying carbon tariffs on this basis, saying:

subsidy means that a firm does not pay the full costs of production. Not paying the cost of damage to the environment is a subsidy, just as not paying the full costs of workers would be . . . other countries should prohibit the importation of American goods produced using energy intensive technologies, or, at the very least, impose a high tax on them, to offset the subsidy that those goods currently are receiving.¹¹²

WTO rules define subsidies more narrowly as a “financial contribution” or “price support” that confers a benefit.¹¹³ Examples include “direct transfers of funds,” “government revenue that is otherwise due is foregone or not collected (e.g., fiscal incentives such as tax credits),” and provision of “goods or services other than general infrastructure.”¹¹⁴ The only option that could apply to Stiglitz’s argument is “government revenue that is *otherwise due* is foregone or not collected.”¹¹⁵ As interpreted by the WTO Appellate Body, the benchmark determining what revenue is “otherwise due” is the normal or standard policy within the country in question.¹¹⁶ Failure to act to price or regulate GHG emissions does not

¹¹⁰ GATT, *supra* note 89, at Art. VI, ¶ 1(b)(i)–(ii).

¹¹¹ *Id.* at ¶ 3.

¹¹² JOSEPH E. STIGLITZ, *A New Agenda for Global Warming*, in *THE ECONOMISTS’ VOICE: TOP ECONOMISTS TAKE ON TODAY’S PROBLEM* 24 (Joseph E. Stiglitz et al. eds., 2008).

¹¹³ Agreement on Subsidies and Countervailing Measures, Art. I ¶ 1.1, 1869 U.N.T.S. 14.

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ See Appellate Body Report, *United States—Tax Treatment for Foreign Sales Corporations*, ¶¶ 88–90, WTO Doc. WT/DS108/AB/RW (adopted Jan. 14, 2002). The Appellate Body held:

qualify as a subsidy under this interpretation, regardless of the regulatory policies of other countries.¹¹⁷ Even if failure to adequately regulate GHG emissions were considered a subsidy, WTO rules only permit countervailing duties to offset subsidies specific to “an enterprise or industry or group of enterprises or industries.”¹¹⁸

d. Article XX General Exception (g)

Measures that otherwise violate WTO rules are permitted if they satisfy at least one of GATT Article XX’s ten general exceptions *and* the Article XX chapeau. General exception (g) is the most promising candidate to support climate-based trade measures.¹¹⁹ Article XX(g) exempts measures “relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.”¹²⁰ Given WTO precedents holding that clean air and stocks of non-endangered fish qualify as exhaustible natural resources, it is likely that the earth’s atmosphere would meet

. . . a ‘financial contribution’ does not arise simply because a government does not raise revenue which it could have raised. It is true that, from a fiscal perspective, where a government chooses not to tax certain income, no revenue is ‘due’ on that income. However, although a government might, in a sense, be said to ‘forego’ revenue in this situation, this alone gives no indication as to whether the revenue foregone was ‘otherwise due.’ In other words, the mere fact that revenues are not ‘due’ from a fiscal perspective does not determine that the revenues are or are not ‘otherwise due’ . . . the treaty phrase ‘otherwise due’ implies a comparison with a ‘defined, normative benchmark.’ The purpose of this comparison is to distinguish between situations where revenue foregone is “otherwise due” and situations where such revenue is not “otherwise due”. . . . Such a comparison enables panels and the Appellate Body to reach an objective conclusion, on the basis of the rules of taxation established by a Member, by its own choice, as to whether the contested measure involves the foregoing of revenue that would be due in some other situation or, in the words of the SCM Agreement, ‘otherwise due.’

¹¹⁷ Pauwelyn, *supra* note 90, at 21–22.

¹¹⁸ Agreement on Subsidies and Countervailing Measures, Part I, Art. 2 ¶ 1.1, 1869 U.N.T.S. 14; Pauwelyn, *supra* note 90, at 22.

¹¹⁹ Article XX(b), which exempts measures “necessary to protect human, animal or plant life or health,” is also raised as potentially justifying carbon duties. However, the requirement that measures be judged “necessary” is generally viewed as a more significant hurdle than XX(g) requirement for measures “relating to” the underlying objection. *See* Pauwelyn, *supra* note 90, at 44.

¹²⁰ GATT, *supra* note 89, at Art. XVIII, ¶ 4(g).

this standard as well.¹²¹ Likewise GHG emissions in other countries clearly have impacts beyond their borders, with at least as substantial a nexus as with depletion of the populations of migratory animals like sea turtles. To qualify for an Article XX(g) exception then, domestic climate legislation must relate to conservation of the earth's atmosphere and the import provisions must be "made effective in conjunction with restrictions on domestic production and consumption."¹²² If border measures merely internalize GHG emissions externalities in a manner comparable to the obligations placed on domestic producers, these tests would likely be satisfied.

The chapeau qualifies this exception with the proviso that "measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade."¹²³ This requirement is distinct from the MFN and national treatment provisions that Article XX provides exceptions to. Instead of prohibiting discrimination with respect to treatment of "like products" the chapeau focuses on "countries where the same conditions prevail." This has been interpreted by the WTO Appellate Body to disfavor attempts to coerce "specific policy decisions made by foreign governments."¹²⁴ In *U.S.—Shrimp*, the original U.S. ban was struck down for requiring other countries to "adopt essentially the same policy."¹²⁵ The Appellate Body approved a modified U.S. provision conditioning market access on "the adoption of a program comparable in effectiveness," finding that this "allows for sufficient flexibility in the application of the measure so as to avoid 'arbitrary or unjustifiable discrimination.'"¹²⁶

In the case of GHG emissions, this would likely be read to require any border tax adjustment to account for existing emissions regulations in exporting countries, regardless of whether they take the same form as those in the importing country. When countries use carbon pricing or regulations based on a SCC, comparing across countries and evaluating the validity of import duties would be relatively straightforward. For

¹²¹ Pauwelyn, *supra* note 90, at 46.

¹²² WTO, TECHNICAL BARRIERS AND SPS MEASUREMENTS 152 (Rudiger Wolfrum et al. eds., 2007).

¹²³ GATT, *supra* note 89, at Art. XX.

¹²⁴ *Id.*

¹²⁵ Appellate Body Report, *United States—Import Prohibition of Certain Shrimp and Shrimp Products*, ¶161, WTO Doc. WT/DS58/AB/R (adopted Oct. 12, 1998).

¹²⁶ *Id.*

countries that adopt GHG emissions abatement measures for which the level of effort is less transparent, however, adjusting duties to reflect prevailing conditions would be more challenging. Nonetheless, it is likely that the WTO would approve of border adjustments that make a genuine good faith effort to determine the relative stringency of GHG emissions regulations and calibrate duties accordingly.

It is also possible that the requirement to take “into consideration different conditions which may occur” may be read in conjunction with the UNFCCC’s principle of “common but differentiated responsibilities” to require developed countries to account for their historic role in contributing to the existing stock of GHGs in the atmosphere when seeking to apply carbon duties to developing countries. There is no WTO precedent on point and it is unclear whether “conditions” would be interpreted to include past behavior related to the policy objective.¹²⁷ However, this could prove the most significant obstacle to the imposition of carbon duties against developing countries under Article XX(g).

The Appellate Body has also interpreted the chapeau to require “serious, across-the-board negotiations with the objective of concluding bilateral or multilateral agreements” prior to imposition of unilateral import measures.¹²⁸ This means that any country intending to impose carbon duties would need to demonstrate a good faith effort to negotiate a climate mitigation agreement with any and all countries that it wishes to apply such duties against. If carbon duties are being employed as part of a genuine effort to achieve global cooperation on climate change mitigation, this should not be a significant hurdle.

e. Conclusions Regarding Trade Linkage Under Current WTO Law

The most promising avenue for justifying border carbon measures under existing international trade law is the Article XX(g) exception. Justifying them as countervailing or anti-dumping duties simply does not hold up to rigorous inspection. While it may be possible to find a way to apply domestic climate policies’ imports in a way that would not be found to violate the MFN or national treatment principles, the strictures of those principles would likely impose highly suboptimal design constraints.

¹²⁷ Pauwelyn, *supra* note 90, at 50.

¹²⁸ Appellate Body Report, *United States—Import Prohibition of Certain Shrimp and Shrimp Products*, ¶166, WTO Doc. WT/DS58/AB/R (adopted November 6, 1998).

A "carbon tax" consistent with these principles would likely be forced to set fixed rates for categories of products, regardless of their production processes, undermining much of the policy rationale for the tax in both its domestic and foreign application. The challenges only become more daunting when considered a domestic cap-and-trade program or command and control regulatory scheme. So, while Article XX(g) can be cumbersome and the chapeau may pose particular challenges with regard to developing countries, it is likely the most viable mechanism for trade linkage under current law. It could probably be used to support a carbon tariff that scales with differences in the stringency of emissions abatement policies that are in place in the importing and exporting countries. Other measures, including Nordhaus's carbon club proposal for across the board tariffs with a binary cutoff based on adopting a particular domestic carbon price, would almost certainly require substantial modifications to international trade law.

4. Non-trade Issue Linkage

Although trade is the most commonly discussed and probably the most potent and universal option for policy linkage, it is worth briefly considering other options. After all, diplomatic negotiations between countries span a wide range of issues; access to foreign markets is only one concern among many. Countries are also less constrained by international law when modifying non-trade policies. Security assistance is sometimes codified in treaty alliances like the North Atlantic Treaty Organization, but these arrangements typically lack enforcement mechanisms.¹²⁹ Foreign aid, arms sales, immigration, intelligence sharing, and joint research and development are typically discretionary or governed by agreements that are subject to renegotiation. Most, if not all, of these policy domains are already used to influence the behavior of other states, both with regard to internal matters like human rights and more traditional geopolitical issues. Trade sanctions are generally reserved for punishing bad actors when diplomatic relations have already degraded significantly. Between countries with moderate to friendly diplomatic relationships, this broader suite of tools of statecraft is more commonly deployed. Sometimes policies like foreign aid and security assurances are publicly and explicitly conditioned, but often such linkages are implicit or expressed in non-public diplomatic communications.

¹²⁹ North Atlantic Treaty art. 5, Apr. 4, 1949, 63 Stat. 2241, 34 U.N.T.S. 243.

To some extent, the pledge and review model relies on a sort of implicit notion that countries that cooperate on global climate mitigation will be rewarded in other policy domains. This is part of what people are getting at when they warn of the consequences for the United States if the Trump Administration cedes global leadership on climate change to China. There is precious little indication, however, that countries expect to experience tangible consequences for failing to make and fulfill ambitious GHG emissions reduction commitments. The United States did not appear to suffer significant diplomatic consequences for failing to ratify the Kyoto Protocol, nor did Canada for withdrawing from it.

One way for countries to show that they take climate change mitigation seriously is to treat it as a first-tier geopolitical issue. If a country fails to adopt stringent emissions policies, it should fear withdrawal of security assistance or guarantees, arms sales, and foreign aid, where applicable. For more powerful countries like the United States, basing rights or other similar concessions could be withdrawn. Likewise, strong climate mitigation performers should be able to anticipate more favorable treatment in these domains. Unlike trade, these policies are less susceptible to codification in a systematic regime. On a less formal basis, however, they can play an important role in nudging countries to adopt more ambitious emissions abatement policies. Climate change need not become the dominant determinant of any country's foreign policy for this to have an impact. All it requires is that countries begin to make it known that that good climate behavior will be rewarded and bad behavior punished and to follow through on these commitments, at least on the margin.

5. Risks and Limitations of Issue Linkage

All the issue linkage options discussed above carry the risk of undermining other important policy goals and breeding international resentment, which could be counterproductive even for emissions reductions purposes. One common difficulty is setting the baseline against which a country's emissions path will be measured. Since there is no consensus on how the burden of climate change mitigation should be distributed, any formula imposed by the wealthier and more powerful countries could produce a backlash in the developing countries it is applied to. Shifting the framing of climate mitigation commitments from mass-based aggregate emissions targets to a carbon price or SCC would provide a more transparent benchmark, but such a move is itself likely to encounter substantial resistance.

Issue linkage strategies would also likely struggle to impose emissions discipline on rich and powerful countries like the United States, which don't rely much on others for foreign aid or security assistance. This concern has recently been elevated in salience and importance due to the results of the 2016 U.S. presidential election. Indeed, in the weeks following this election, officials in the Canadian and Mexican governments, as well as former French President and then-presidential candidate Nicolas Sarkozy, floated the idea of carbon tariffs against the United States if President-elect Trump withdraws from the Paris Agreement.¹³⁰ Whether such retaliations will come to pass and what effect they might have remains to be seen, however there is some reason to doubt their coercive power and also to worry about the potential for a trade war. The precedent that countries are only punished when they back out of commitments might also generate a disincentive for governments to make ambitious pledges in the future. The proper incentive structure would require sufficient inducements for countries to make ambitious pledges and to actually meet them, not merely refrain from officially renouncing them. Despite these difficulties and limitations, it is worth exploring whether linking climate change mitigation with other policy domains can enable introduction of incentives that internalize some of the costs imposed on the rest of the world by any one country's GHG emissions. Trade linkage is likely to prove the most potent option, but other tools can play an important supporting role.

C. *Globally Harmonized Carbon Pricing*

A more ambitious approach would be introduction of a globally harmonized carbon price, either in the form of a carbon tax or cap-and-trade scheme. Once in place with adequate enforcement and verification, this could fully internalize the costs associated with GHG emissions, wherever they occur. The major hurdle would be getting everyone to agree to participate on terms that are consistent with stabilizing atmospheric GHG concentrations at a tolerable level. The domestic politics of cap-and-trade and carbon taxes in the United States are likely to present a substantial obstacle in this regard. It would also necessarily entail an up-front agreement regarding the distribution of the burden of climate

¹³⁰ Coral Davenport, *Diplomats Confront New Threat to Paris Climate Pact: Donald Trump*, N.Y. TIMES (Nov. 18, 2016), <http://www.nytimes.com/2016/11/19/us/politics/trump-climate-change.html> [https://web.archive.org/web/*/http://www.nytimes.com/2016/11/19/us/politics/trump-climate-change.html].

change mitigation, though not necessarily the geographic location of the emissions reductions. In the tax scenario, the key distributional variable would be allocation of the revenues from the tax. For cap-and-trade, allowances could be auctioned, allocated freely, or some combination. If given freely, the burden of mitigation would be determined by that distribution. If auctioned, it would be determined by the allocation of revenues, as in the carbon tax scenario. In either case, it would foreground the ultimate issues related to the just and practicable distribution of the burden of mitigation. Whether this should be considered a feature or a bug is open for debate, but these issues will have to be addressed at some point. It is exceedingly unlikely that a decentralized voluntary process will resolve these issues without ever confronting them, with parties' commitments happening to aggregate to sufficient emissions reductions to achieve the world's stabilization goals. The fact that the prospects for agreement on global carbon pricing seem so dim only underscores the depth of the broader challenge facing climate mitigation policymakers.

Moreover, the potential for at least some states to benefit financially from participation in the carbon pricing scheme could be used to induce them to participate. Such states would have to be allocated a share of free allowances or tax/auction revenues that exceed the sum of their payments into the system and the net domestic costs of their induced emissions reductions. This could not be done for everyone, so some states would have to be willing to shoulder significant economic burdens to get the project going. In principle, however, there is scope for an agreement in which all countries experience net benefits from the scheme, when the avoided climate change impacts are considered. However, such benefits are largely irrelevant to the incentives facing potential outliers, since they would expect to reap most of these benefits even if they refuse to participate. The international community is unlikely to be able to credibly commit to forego mitigation measures unless all states participate. Absent such commitment, the incentives to participate are limited mostly to potential financial rewards within the system, which are negative sum, and states have an incentive to hold out and demand favorable treatment for their participation. One way of restating the problem is that the transaction costs of international bargaining may be too high for negotiations to be successful, even though there exists an agreement that would make all parties better off.

Another concern is that the basic incentive logic would seem to require a bargain where those least affected by the impacts of climate

change would have to be given the most financial incentive to participate, which runs counter to deep notions of justice.¹³¹ Finally, the introduction of side-payments or other forms of international redistribution of benefits and burdens would open the door to countries holding out to maximize bargaining leverage. This is the same stab-in-the-back concern raised by Nordhaus in the climate club discussion.¹³² The risk must be weighed against the potential for side payments or distributional adjustments to system design features to induce cooperation that would not otherwise be possible. It is also unclear that a refusal to entertain side-payments could be made sufficiently credible to deter countries from holding out. In that case, the importance of having effective tools for punishing outliers, including those discussed in the issue linkage section above, would be further elevated.

D. *Sovereign Global Climate Authority*

The alternatives discussed above and their limitations point to one final option, infringement of national sovereignty on core issues of global governance like climate change. While nation-states serve crucial functions and many policy problems are best addressed at the national or subnational level, climate change cries out for robust global governance. However, the requisite infringements on sovereignty appear implausible. Existing international institutions lack the capacity to take on greater powers without the consent of their member states. States tend to jealously guard their sovereignty and have not evinced any willingness to sacrifice it for the sake of climate mitigation. However, the nation-state has only been the dominant form of government for at most the few centuries since the 1648 Peace of Westphalia and perhaps should not be viewed as the final or natural structure of world politics.¹³³ The formation of the United States from thirteen colonies and the gradual integration of Europe under the banner of the European Union provide some precedent for consensual relaxation of sovereignty. When the WTO's adoption was debated in the early 1990s, opponents rightly claimed its authority to issue legally binding decisions would substantially constrain

¹³¹ See generally Daniel A. Farber, *Climate Justice*, 110 MICH. L. REV. 985 (2012).

¹³² Nordhaus, *supra* note 61, at 1239–40.

¹³³ Derek Croxton, *The Peace of Westphalia of 1648 and the Origins of Sovereignty*, 21 INT'L HIST. REV. 569, 569 (1999); Andreas Osiander, *Sovereignty, International Relations, and the Westphalian Myth*, 55 INT'L. ORG. 251, 270 (2001).

national sovereignty.¹³⁴ Yet it overcame these objections and now countries routinely submit to WTO judgments.¹³⁵

More broadly, all of international law can be said to impose some limits on state sovereignty, with infringements expanding as globalization presses on.¹³⁶ These dynamics have led some scholars to speak of *graduated sovereignty*, where the workings of global markets compel smaller states to cede certain forms of sovereignty.¹³⁷ Meanwhile, other scholars note that “the control and authority of states have been persistently challenged” over the course of history, since “no authority structure [] can definitively choose among competing normative prescriptions, including the conflict between non-intervention and various justifications for intervention in the internal affairs of other states such as the protection of human and minority rights.”¹³⁸ By this reasoning, an anarchic system of interstate relations is not qualitatively more conducive to untrammelled national sovereignty than a system of robust international law. As in the domestic context, the sovereign rights of one state inevitably come into conflict with the prerogatives of another. If this is true of domestic human rights abuses and labor practices, it is all the more true for emissions of gases that alter the global climate.

While interest in world government among scholars and policymakers has waned since the end of World War II, there is a long tradition of support for the idea dating back to Dante Alighieri in the early fourteenth century and running through Hugo Grotius, generally considered the father of international law, and Immanuel Kant’s *Perpetual Peace*.¹³⁹ The notion of world government became central to public debate regarding world affairs in the 1930s and 1940s and was endorsed by 1940 Republican presidential nominee Wendell Willkie.¹⁴⁰ Climate change mitigation would not require full abdication of national sovereignty to a world government, only a narrow delegation to emissions controls. For instance, the climate authority could be authorized to levy a carbon tax, with the

¹³⁴ Phillip R. Trimble, *Globalization, International Institutions, and the Erosion of National Sovereignty and Democracy*, 95 MICH. L. REV. 1944, 1944 (1997).

¹³⁵ *Id.* at 1945–46.

¹³⁶ *Id.* at 1946.

¹³⁷ Aihwa Ong, *Graduated Sovereignty in South-East Asia*, 17 THEORY, CULT. & SOC’Y 55, 57 (2016).

¹³⁸ Stephen D. Krasner, *Globalization and Sovereignty*, in STATES AND SOVEREIGNTY IN THE GLOBAL ECONOMY 34 (David A. Smith et al. eds., 1999).

¹³⁹ Thomas G. Weiss, *What Happened to the Idea of World Government*, 54 INT’L. STUD. Q. 253, 259 (2009).

¹⁴⁰ *Id.* at 260.

tax rate and distribution of revenues determined by through its own internal governance procedures, rather than a negotiation between sovereign states. Alternatively, a more decentralized approach, akin to cooperative federalism in the United States, could be adopted where the global climate authority sets a minimum carbon price or national emissions caps and national governments are given flexibility to choose the mix of policies to meet their obligations. This would have to be backstopped by the threat of sanctions against countries that fail to comply or direct regulation by the global climate authority, analogous to denial of federal funding to states and the Environmental Protection Agency imposition of federal implementation plans under the Clean Air Act.

It is true that in 2017 the world is currently experiencing a backlash against globalism, but it is too early to tell whether this will prove a turning point or a mere bump in the road. We should not prematurely rule out the possibility that the grave threat of climate change could induce the nations of the world, or their peoples and institutions more directly, to see and act on the need for a sovereign global authority to address climate change mitigation. Indeed, talk of an international climate regulatory agency dates back to negotiations over the Kyoto Protocol in late 1990s, when UK Deputy Prime Minister John Prescott proposed “an equivalent of interpol to police, customs and enforcement agencies to combat” illegal trade and other violations of the carbon dioxide emissions permitting system.¹⁴¹

One caveat to this analysis is that the WTO and other existing institutions of international law lack the sort of independent enforcement power that might be needed to effectively address climate change. Instead, WTO decisions are enforced by the threat of legally sanctioned retaliation against actions that violate the GATT imposed by countries that were already free to engage in the same forms of retaliation before the adoption of the GATT and WTO.¹⁴² There is no precedent for deeper consolidation of sovereignty absent a common outside threat or enemy. Whether climate change is too abstract and impersonal a threat to perform this function remains to be seen. If so, perhaps a WTO-like body (or the WTO itself) that authorizes states to punish other state

¹⁴¹ Henry I. Miller, *Biotechnology Regulation and Foreign Policy: Eccentric Environmentalism Instead of Sound Science*, in *THE GREENING OF US FOREIGN POLICY* 331, 230 (Terry L. Anderson & Henry I. Miller eds., Hoover 2000).

¹⁴² Terry L. Anderson & J. Bishop Grewell, *It Isn't Easy Being Green: Environmental Policy Implications for Foreign Policy, International Law, and Sovereignty*, 2 *CHI. J. OF INT'L. L.* 427, 435 (2001).

climate outliers could help make the policy linkage approach discussed above more viable by enhancing its legitimacy. The Montreal Protocol's non-compliance procedure, for instance, does ultimately enable suspension of specific rights and privileges to be imposed on parties that are found in violation of the treaty and fail to rectify the situation.¹⁴³

In considering this route, there is reason to fear that an authority initially granted powers restricted to climate change mitigation will expand and undermine national sovereignty more broadly, setting itself up as a dominant global government. The expansion of the powers of the federal government in the United States since the 1930s provides some basis for concern that constitutional constraints may fail to reign in such mission creep.¹⁴⁴ Whether emergence of a broader form of global government is necessarily something to be feared is beyond the scope of this paper, but the prospect is worth acknowledging. At the very least, the potential for this government to degrade into an oppressive dictatorship with no external rivals or possibility of escape is worthy of some trepidation. As with the other proposals raised in this paper, however, this risk must be weighed against the risks of failing to adequately address the climate crisis.

CONCLUSION

All of the alternatives discussed in this paper involve formidable challenges and risks. Negotiation tools like conditional emissions reduction and issue linkage are risky and may be underpowered for the task at hand. A global harmonized carbon price is an extremely attractive policy goal, but there is no clear path to adopting one. A robust sovereign global climate authority could impose the needed emissions reductions, but the

¹⁴³ UNITED NATIONS ENVIRONMENT PROGRAMME, HANDBOOK FOR THE INTERNATIONAL TREATIES FOR THE PROTECTION OF THE OZONE LAYER 297 (6th ed. 2003), http://www.lindegas.com/internet.global.lindegas.global/en/images/Montreal%20protocol%20handbook%20200317_104517.pdf?v=2.0 [<https://perma.cc/LE6H-BW6L>].

¹⁴⁴ Before the 1930s, the Commerce Clause was interpreted narrowly, denying the federal government broad powers to regulate economic activity. In the New Deal era, the Supreme Court, in part due to political pressure from the Roosevelt Administration, reinterpreted the Commerce Clause to uphold New Deal programs on the basis that they regulated activities that, in aggregate, have a substantial effect on interstate commerce. This "post-New Deal Commerce Clause doctrine reveals the inherent difficulties in limiting the scope of federal Commerce Clause powers based upon simple tests that demarcate the proper allocation of authority between the states and the federal government." Maxwell L. Stearns, *The New Commerce Clause Doctrine in Game Theoretical Perspective*, 60 VAND. L. REV. 1, 8 (2007).

path to peacefully creating one is similarly murky and carries significant tail risk of its own. Nonetheless, it seems clear that the current voluntary, bottom-up approach is severely underpowered relative to the scale of the challenge. If policymakers are serious about climate change mitigation, alternatives like those discussed above must be considered and refined. The foregoing analysis does not provide final answers regarding the proper structure of climate change mitigation institutions, but my hope is that it can spark a conversation that moves us beyond the current paradigm. Future work in this area, for instance, may consider the potential for crafting international institutions that account for the role of domestic politics in shaping climate change mitigation and producing outcomes that deviate from the predictions of traditional international relations theories that treat states as black boxes. My intent here is not to disparage the great and noble efforts of those who crafted the process that led to the Paris Agreement. Their contributions are vital and the agreement was an important step in the right direction. However, I remain deeply skeptical that the basic approach embodied in the agreement will ultimately be capable of achieving its stated goals.