

Border Carbon Adjustments in a Post-Paris World: Same Old, Same Old, but Different?

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Introduction

With the adoption of the Paris Agreement in 2015, nations ushered in a new era of international climate change cooperation. To meet the Agreement's goal of keeping global temperature increase well below 2°C, countries need to adopt increasingly ambitious national emissions control pledges. While the Agreement covers all countries, ambition levels and the implementation of policy measures will likely vary. Any unevenness in ambition or implementation will increase pressure on policy makers to prevent loss of competitiveness, relocation of carbon-intensive production to other countries (*carbon leakage*), and free rider behavior. Addressing these issues will likely require measures providing some form of remedy for producers subject to carbon constraints. This paper focuses on one such proposal: *border carbon adjustments*.

Border adjustments are charges levied on the greenhouse gases emitted during the production of a good (*carbon content* or *embedded carbon*). In 2008-2009, such measures came to the forefront of climate change policy discussions in both the European Union and the United States. In the European Union, policy makers raised the prospect of border adjustments as a way to counter the problem of carbon leakage in the context of a revised emissions trading system. In the United States, border adjustments featured prominently in several cap and trade bills brought before Congress.¹

Despite the emergence of these proposals, for various reasons, none were adopted. Border carbon adjustments can be difficult to administer, as they require some information about the carbon embedded in traded products.² Furthermore, the extent to which they help reduce carbon leakage depends on their scope and coverage.³ Perhaps most importantly, as a trade measure with extraterritorial implications, policymakers tend to view border carbon adjustments as politically toxic. Consequently, calls for the development of border carbon adjustments as an emerging climate change policy tool faded into the background.

New debates arose on border adjustments in the context of the Paris Agreement and its inclusion of all countries as a universal climate change agreement. In recent years, policy makers have increasingly pushed for the development of a carbon charge imposed at the border. French President Emmanuel Macron referred to such a measure as “indispensable.”⁴ Mexico’s national climate change pledge under the Paris Agreement contains a reference to the possible adoption of border adjustments.⁵ Similarly, Canada’s environment minister, Catherine McKenna, suggested that border adjustments merit consideration.⁶

These calls deserve a response, as the alternatives to border carbon adjustments used in practice have an unsuccessful track record. The European Union, for instance, decided to hand out emissions allowances for free, resulting in windfall profits for industries and a distorted carbon price signal.⁷ Countries implementing a carbon charge often include exemptions or rebates for sectors vulnerable to leakage, reducing climate change policy effectiveness and lowering public revenues.⁸ The recent trend of protectionist retrenchment and tariff increases has arguably muted concerns about delicate trade balances, shifting perceptions of what constitutes politically acceptable behavior. Appetite for climate-related trade restrictions may therefore be greater than before.

However, if border adjustments are implemented, policy makers need to address concerns about violating international trade law. More generally, policy makers need to ensure that the countries potentially affected by border adjustments perceive these measures as fair and transparent. This paper outlines how such a design could be developed. First, we introduce the concept of border carbon adjustments and explain how they have featured in policy discussions thus far. We then examine the compatibility of border carbon adjustments with World Trade Organization (WTO) law. Finally, we outline several design principles that could guide the adoption and implementation of such measures.

Disentangling the Concept of Border Carbon Adjustments

Border carbon adjustments aim to minimize the negative impacts of uneven climate change efforts by leveling the carbon constraint at the border, either by including imports or by exempting exports. Specifically, they address three closely connected problems: (1) the impacts of carbon constraints on the competitiveness of trade-exposed energy-intensive industries, (2) the relocation of carbon-intensive production to other countries and the associated carbon leakage, and (3) free-riding behavior on the climate change action of others.

Border adjustments can, in principle, be coupled with any type of climate change policy. Most commonly, they are related to carbon pricing instruments, such as a carbon tax or emissions trading system. If implemented in tandem with a carbon tax, the border adjustment would extend the tax liability to imported goods or rebate the tax payment to exporters. In WTO jargon, this would be called a *border tax adjustment*.⁹ Under an emissions trading system, the measure would take the form of a requirement for domestic importers or foreign exporters to

surrender emissions allowances based on the carbon content of a good, mirroring the obligation of domestic producers.¹⁰

Other climate change policies applied at or beyond the border share certain features with border carbon adjustments. These include policies extending beyond a country's territory, such as the European Union's attempt to include international aviation in its emissions trading system. Unlike a border adjustment, however, this measure did not adjust for differences in climate change ambition, but simply applied a European constraint to all international air travel, both within and outside the European Union.¹¹ While border carbon adjustments are similar to policies addressing emissions from consumption in that they require the tracking of emissions embedded in traded goods, consumption-based policies need not be implemented at the border. Further, they do not seek to offset differences in climate change ambition across jurisdictions.¹² Border adjustments should also be distinguished from the proposal to create a club of countries that would impose a punitive tariff against products from trading partners outside the group.¹³ While this proposal also tackles the free-rider problem, it does not seek to adjust for differences in climate change policy ambition.

To effectively address carbon leakage, border carbon adjustments need to target the sectors that are most affected. While there has been a concern that companies will move abroad due to increasingly stringent climate change regulations, emissions leakage in practice has been limited, mainly due to low carbon prices.¹⁴ With rising carbon prices, however, the risk of carbon leakage may increase in the future. Even then, carbon leakage is likely to be limited to a few trade-exposed, energy-intensive sectors, such as cement, steel, and aluminum. These sectors are therefore ideal starting points for border carbon adjustments.¹⁵ Limiting the number of sectors would also help reduce the administrative cost of implementing the measure. Such costs would

increase significantly if consumer goods such as cars or electronic appliances were included, as the calculation of embedded emissions would become more challenging.¹⁶ Moreover, expanding the coverage to finished products would increase the risk of *trans-shipment*—the strategic behavior of affected firms and countries to channel goods through countries that are not subject to the border adjustment.¹⁷

In terms of environmental effectiveness, a survey of economic studies suggests that border carbon adjustments could reduce the leakage ratio compared to a scenario without the measure.¹⁸ Border adjustments also tend to compare favorably to other anti-leakage policies, such as carbon pricing with output-based rebates for energy-intensive industries.¹⁹ If implemented, however, the effectiveness of border carbon adjustments will greatly depend on their design. So far, despite a number of policy proposals, as the next section shows, there has been limited practical experience with such measures.

Theory Meets Reality: Border Carbon Adjustments in Practice

Unsurprisingly, carbon leakage concerns first emerged in the context of the European Union's emissions trading system, the world's largest supranational cap and trade system. Energy-intensive industries voiced concerns when the European Union started to shift from allocating emissions allowances for free to an auction system in 2008. Industries argued that they should continue to receive free allowances, claiming that the cost of buying allowances would lead to carbon leakage and loss of a competitive edge. These arguments resonated with European policy makers, who continued the free allocation of allowances for industries involved in international trade that were at risk of facing compliance costs above a certain threshold. Nevertheless, in the revision of the emissions trading directive, border adjustments emerged as an option.

Specifically, the European Commission circulated an informal proposal for a “Future Allowance Import Requirement”—a measure that would have included importers of products from sectors covered by the emissions trading system unless trading partners took comparable action to that of the European Union.²⁰ The proposal also extended to exporters, who would have been able to receive allowances upon export. The calculation of the adjustment for imports would have been based on average European emissions for the covered goods, taking into account the level of free allocation. Although the measure never found its way into the formal legislative proposal to amend the emissions trading directive, the revised directive introduced a provision listing the inclusion of importers as an option to be considered in light of the outcome of international negotiations.²¹

Border carbon adjustments re-emerged in European discussions in 2009, when France proposed a *carbon inclusion mechanism*. Under this proposal, importers would have been obliged to purchase allowances under the emissions trading system. The measure would have targeted either the countries that failed to participate in a future international climate change agreement, or goods from countries that had no comparable policies in place. A few years later, following the adoption of the Paris Agreement, France issued another proposal, this time focusing on the cement sector. Though the proposal was taken up in the European Parliament, it failed to secure the necessary votes to be adopted.²²

In short, no border adjustment proposal has ever passed the political process in Europe, and with the political backlash against the inclusion of international aviation in the emissions trading system still fresh in the minds of European policymakers, it is likely that any similar measure will remain off the table in the near future.²³ However, the continued efforts of important political players—for instance the Italian Senate and the CEO of steel company

ArcelorMittal, in addition to President Macron—suggest that border adjustments will remain part of the European climate change policy toolbox.²⁴

As the European Union was considering border carbon adjustments for the first time, several proposals for new climate change legislation in the United States started to include provisions on border adjustments. Following an initial proposal by the International Brotherhood of Electric Workers and American Electric Power, most legislative proposals contained some variation of an *international reserve allowance program* that would require importers to surrender allowances. While the proposals initially focused on energy-intensive primary goods such as cement and steel, subsequent bills also included consumer goods. Just like the European proposals, the border adjustments proposed in most bills were aimed at countries that failed to take “comparable action.” To calculate the level of adjustment, most bills followed a formula that accounted for the associated greenhouse gas intensities of the covered good in foreign countries, an adjustment factor for allowances allocated for free in the United States, and an economic adjustment ratio for foreign countries.

Needless to say, none of these proposals were passed by Congress, even though the American Clean Energy and Security Act proposed by Congressmen Waxman and Markey did make it through the House of Representatives. Nonetheless, a form of border adjustment found its way into legislation in California, the fifth largest economy in the world. Although the Californian legislature has contemplated a border adjustment along the lines described in the proposals above, it is yet to adopt any such measure. However, under Californian law, importers of electricity are liable for the emissions associated with electricity generated from sources outside of California, unless the place where the electricity is coming from has links to California’s emissions trading system.²⁵

Following the election of President Donald J. Trump, the prospect for ambitious U.S. climate change policy has become dimmer. Nonetheless, a proposal from a group of veteran Republican leaders highlights that combining a carbon tax with border carbon adjustment could be an effective measure to address climate change.²⁶ Indeed, any climate change policy that is to gain bipartisan support will need to consider border adjustments as part of the solution.

Border Carbon Adjustments and WTO Law: A Real or Perceived Barrier?

International trade law is regularly invoked as a reason not to adopt border carbon adjustments.²⁷ But the compatibility of any specific measure with trade law will first and foremost depend on its design and application.²⁸ Still, it is important to take trade law constraints seriously.

The first question to consider is whether border carbon adjustments are permissible “border tax adjustments” based on the General Agreement on Tariffs and Trade (GATT). According to GATT Article II:2(a), countries can impose a charge on an imported product, provided it is equivalent to an internal tax the country already imposes on “like” domestic products.²⁹ While a GATT Working Party offered some guidance on the legality of border tax adjustments, it failed to reach a conclusion regarding inputs in the production process that are not physically traceable in the product.³⁰ In other words, it remains unclear whether a border tax adjustment would be allowed based on the carbon emitted or energy consumed during the production process of a good. Subsequent WTO case law has also left this issue undecided. In the *US—Superfund* case from 1987, a GATT Panel ruled that the United States could impose a domestic tax on chemicals, as well as a tax on imports of products that had used those chemicals in the production process. However, the Panel failed to indicate that those chemicals needed to be physically traceable.³¹ Moreover, it remains open for debate whether the inclusion of

importers in an emissions trading system—thus far the most common proposal—would be “equivalent to an internal tax” under GATT Article II.2(a).

The “national treatment” provision of GATT Article III:2 further specifies that “like” imported products should not be discriminated against relative to domestic products. This raises the question whether a border adjustment can differentiate based on the manner in which goods were produced (the “processes and production methods”) as opposed to the properties of the final product. WTO jurisprudence has shed light on what makes products “like” in the context of GATT Article III:2, highlighting that the term refers to the properties, nature, and quality of the products; the end uses of the products; consumers’ perceptions and behavior in respect of the products; and the tariff classification of the products.³² These criteria have yet to be tested in a climate-related dispute, creating uncertainty as to whether differences in embedded carbon can justify distinguishing between otherwise comparable products. At any rate, allowing foreign producers to document their actual emissions would be helpful to avoid a violation of GATT Article III:2 because domestic producers are also subject to carbon constraints based on their actual emissions.³³

Another question arises in the context of the requirement of “most-favored-nation treatment,” which requires countries to extend any benefits granted to one party under GATT to all parties.³⁴ Several proposals described in the previous section were designed to apply to countries that fail to take comparable climate change action. Such a provision would likely violate Article I because it would favor some trading partners based on their climate performance.³⁵ Likewise, exempting countries, because of their low emissions or low development status, could be problematic. However, if the border adjustment applies uniformly

to all imports, regardless of country of origin and country-specific features, it should meet the most-favored-nation requirement.

Countries seeking to impose border carbon adjustments have a choice. They can ensure that the proposed measure avoids discriminating against “like” products by taking into account the criteria put forward by jurisprudence. They can also preempt a violation of the most favored nation rule by applying the measure across the board. Another option is to accept that the border adjustment will likely violate one or both of these provisions and instead ensure that the measure is protected by recourse to the environmental exceptions of GATT Article XX. The latter approach raises a different set of legal issues.

First, for a measure to pass under the environmental exceptions of GATT, it must be considered “necessary” to protect human, animal, or plant life, or health under Article XX(b), or it must be “relat[ed] to” the conservation of exhaustible natural resources under Article XX(g). Of the two, the Article XX(g) test is the easier to meet. The test requires a close relationship between the ends and means of a trade measure.³⁶ In other words, the trade measure has to have a clearly defined objective that aligns with the exceptions set out in Article XX, and it has to be designed to achieve that objective. An environmental rationale—e.g., tackling carbon leakage, internalizing the social cost of carbon, overcoming domestic pushback against deeper emission reductions, or inducing other countries to join international climate change efforts—would help prove that a measure meets the Article XX(g) test. By contrast, an economic rationale—e.g., safeguarding the competitiveness of energy-intensive industries or protecting jobs—would not be a legitimate objective under Article XX(g).³⁷ Another test under Article XX(g) is whether the measure is “made effective in conjunction with restrictions on domestic production and consumption.” As long as the border adjustment is linked to a carbon tax or emissions trading

system that imposes constraints on domestic producers of the same goods, this condition should be met.³⁸

Once the measure is deemed to fall within the scope of Article XX's environmental exceptions, it will have to meet the requirements of the *chapeau*, or introductory paragraph, which specifies that the application of the measure must not constitute a "means of arbitrary or unjustifiable discrimination" or a "disguised restriction on international trade."

A first relevant question in this regard is whether the border adjustment applies to both imports and exports, or to imports only. An export rebate would be unlikely to pass the *chapeau* test, as it could discourage emission reductions in export-oriented sectors, and thereby undermine the environmental rationale of the measure.³⁹

Another question is how border adjustments account for climate change policies in other countries. WTO case law suggests that Members are allowed to condition market access on the establishment of regulatory programs "comparable in effectiveness" to the program in the country adopting the measure, as long as "sufficient latitude ... to achieve the level of effectiveness required" is provided.⁴⁰ In other words, the country imposing the border carbon adjustment should consider whether another country already has climate change mitigation policies in place, and if so, how effective those policies are. Moreover, the country imposing the measure needs to do so "taking into consideration different conditions which may occur" in other countries.⁴¹ A blanket requirement that other countries have the same policies or targets in place is therefore unlikely to withstand scrutiny.

Likewise, it matters whether and how the measure differentiates between different countries. For various reasons, border carbon adjustments may target specific countries (e.g., major emitters or countries that are not a Party to the Paris Agreement) and exempt others (e.g.,

least developed countries, or emitters that fall below a *de minimis* threshold). If the environmental rationale for the measure is to induce states to adopt climate change measures of their own or join international efforts to address climate change, it may be necessary to target specific countries. But exempting some countries may also be warranted. According to Article XX, the country imposing the border adjustment should consider whether different conditions (e.g., level of economic development) prevail in other countries, which may be the case for least developed countries.⁴² In short, differential treatment of countries—which runs counter to the logic of Article I GATT—may actually increase the chances of an Article XX defense.

Pursuant to case law on Article XX, the introductory paragraph also requires that the country imposing a border adjustment meet basic fairness and due process criteria.⁴³ Accordingly, the timing of the border adjustment matters. Giving immediate effect to the border adjustment would effectively leave little or no time for other countries to introduce stronger climate change policies, and could thus undermine the chances of justifying the measure under Article XX. Similarly, the country imposing the border carbon adjustment should have engaged in “serious, across-the-board negotiations with the objective of concluding bilateral or multilateral agreements” to address climate change.⁴⁴ Ongoing climate change negotiations—or even the negotiations that led to the Paris Agreement—arguably meet this criterion. However, bilateral negotiations with countries potentially affected by border carbon adjustments may be warranted in light of basic fairness and due process criteria.

Designing Border Carbon Adjustments for Enhanced Climate Action

The Paris Agreement with its embedded logic of progressive climate change ambition and stated objective of net zero emissions by mid-century should result in a global convergence of

mitigation efforts.⁴⁵ In the near term, however, domestic climate change action will remain characterized by heterogeneity. Border carbon adjustments can offer both effective protection against leakage and an incentive for other countries to strengthen their efforts. Still, they are politically controversial and administratively demanding, requiring a careful design.⁴⁶ This section outlines key principles for border carbon adjustment design that strike a balance between legal durability, ease of implementation, and environmental performance.

Scope and Coverage

First, to deter domestic producers from increasing the carbon intensity of exports, border carbon adjustments should cover imports only. Doing so would reduce legal risk, while still securing a majority of its potential benefits.⁴⁷

Furthermore, the scope of the measure should be limited to primary goods only, meaning commodities from sectors facing high carbon costs and trade exposure, and with limited ability of passing the costs to consumers. Focusing on primary goods only helps to reduce the administrative and technical burden without sacrificing a majority of environmental benefits.⁴⁸

Primary good sectors include cement, steel, and aluminum, where the value of embodied carbon products, as a percentage of value added, tends to be relatively high compared to the manufactured products.⁴⁹

To reduce the risk of trans-shipment strategies by importers, the border adjustment could opt for a sectoral focus and avoid exempting entire countries based on country-specific attributes, such as domestic climate change policies or participation in an international climate change agreement.⁵⁰ However, uniform application to all countries would reduce the leveraging effect of border carbon adjustments. It would also be at odds with the principle of *common but*

differentiated responsibilities and respective capabilities of the climate change regime and the *special and differential treatment* provisions of the trade regime. Therefore, differentiation should be based on the carbon content of products, not their country of origin. One way to introduce differentiation is to give countries an opportunity to demonstrate the stringency of their domestic climate change efforts, averting the imposition of the measure or reducing the adjustment level. Moreover, exempting the least developed countries—who contribute only minimally to global emissions—would be compatible with the environmental objective of the border adjustment.

Finally, countries imposing a border carbon adjustment need to determine the covered policies for which to adjust differences in ambition. This is easiest for policies that create an explicit carbon price, although other types of carbon constraints may be included in its scope over time, using methodologies that estimate the stringency and comparability of climate change efforts.

Carbon Content

Once the difference in carbon constraints applicable to domestic and foreign goods has been determined, the border adjustment can be implemented by multiplying this difference with the carbon content of imports. Calculating the carbon content of imports, in turn, requires a decision on the scope of emissions to be considered. Ideally, a border carbon adjustment will apply to direct emissions from production plus indirect emissions from energy and heat inputs, which would cover the majority of product-related emissions without additional technical complexities. For direct emissions, global sectoral benchmarks—e.g., based on the best available technologies in a given sector—could be used as a proxy for the carbon intensity of products. Indirect

emissions could be calculated based on average grid emission factors in the country of origin. Using regional or local factors would avoid a legally problematic link to country-specific characteristics and reflect real-world energy markets more accurately.⁵¹

In the absence of suitable or accurate data, a jurisdiction imposing a border carbon adjustment could determine the amount of embedded carbon based on the average direct and indirect emissions intensity of its own domestic goods.⁵² As aggregate values, however, standardized benchmarks will fail to represent the emissions performance of individual emitters accurately. Therefore, foreign producers should be afforded an opportunity to document actual emissions with third-party verified data, and demonstrate that their carbon intensity is lower than a sectoral benchmark. This mechanism would provide a permissible element of differentiation, contributing to the leveraging purpose of the measure and incentivizing mitigation in exporting countries.⁵³ However, it can also raise administrative challenges and strain capacities of some affected trading partners, justifying allocation of some or all of the revenue to foreign capacity-building efforts.⁵⁴

Adjustment Level

Once embedded emissions have been calculated, the next step is to determine the adjustment level. As a default, the adjustment will be based on the sectoral benchmark multiplied by the product volume and the difference in carbon constraints (expressed as a *carbon price differential*), which, in the case of a fluctuating carbon price (e.g., in an emissions trading system), may have to be averaged out across a specified period. Where no (explicit) carbon price has been implemented, or where multiple carbon constraints operate alongside each other, an effective carbon rate can be calculated to serve as a proxy; that is challenging, but possible with

existing methodologies.⁵⁵ Border carbon adjustment is only meant to correct the differential between the foreign and domestic climate change policy cost in the covered sectors.

Accordingly, the adjustment level has to reflect any exemptions, rebates, or free allocation in the importing country, as well as carbon constraints applied to imports in the country of origin, all of which are then deducted from the determined level.

Revenue Use

Any revenue collected through the application of a border carbon adjustment should be used to further its environmental objective. To improve its political viability and align with the differentiation principles mentioned earlier, it should additionally benefit developing countries facing costs because of the border adjustment – for instance to reduce the carbon footprint of their exports.⁵⁶ Although using the revenue generated this way may weaken the domestic benefits of introducing border carbon adjustments and could thus make it harder to gain support for the measure, it avoids shifting a disproportionate burden on developing countries and being inconsistent with the differential treatment rules under the climate and trade regimes.⁵⁷

Therefore, revenue should be at least partly allocated to developing countries to support domestic mitigation and adaptation efforts and to build capacity on measurement, reporting, and verification of climate change policies, ultimately contributing to the emergence of a more homogenous climate change landscape. Designed this way, a border adjustment can result in net financial flows to beneficiary countries, while measurably contributing to the climate change finance obligations of implementing countries.⁵⁸

Expiration

Instruments that generate revenue can become entrenched in policy frameworks even after their primary objective has long been achieved. A border adjustment, however, should be designed to be temporary in nature, and contain a sunset clause prescribing its expiration unless its extension is expressly warranted to counteract emission leakage. More generally, border carbon adjustments are not a desirable and stable framework for climate change action in the long run, as its parallel operation with a number of other measures would incur considerable administrative complexity.⁵⁹ Given the leveraging effect of border adjustments, they ideally prompt their own obsolescence. As countries gradually expand and deepen their domestic climate change policy frameworks, the need to adjust for policy differentials subsides, and with it the utility of a border carbon adjustment.

Process

The design and implementation of a border adjustment should occur through a deliberate process that ensures fairness, transparency, and predictability in order to improve political acceptance and the odds of passing legal muster. In addition, any border adjustment measure should provide opportunities for participation by affected countries as well as appellate and review procedures. Serious and inclusive negotiations, conducted in good faith, should precede the application of a border carbon adjustment and aim to reduce the differential in carbon constraints that raise concerns of leakage. Such bilateral or multilateral engagement is critical to evade assumptions of protectionism. Given the nationally determined nature of the Paris Agreement, it may not be enough to satisfy this requirement, as individual climate change efforts are not centrally negotiated within the international regime.

Moreover, when introducing or expanding a border adjustment to additional sectors, policymakers should consider impact studies that discuss the effects on downstream sectors, that is, those sectors further down the value chain that will be affected by increases in input costs. Actual implementation should then be preceded by an early announcement and sufficient lead time to maximize the leveraging effect of the border adjustment on other countries and afford them adequate time to prepare and implement more ambitious climate change action of their own.⁶⁰

Conclusions

The very idea of border carbon adjustments has generated controversy in the past, both in legal and economic scholarship and practice. But the political context has changed substantially since this climate change policy tool was first proposed on both sides of the Atlantic. This shift suggests that border adjustments may now merit reconsideration.

The ambition gap between national climate change pledges under the Paris Agreement and global temperature goals, along with the diversity of the commitments themselves, will become increasingly apparent as the international community embarks on the process to review the aggregate of national pledges. While the heterogeneity of domestic climate change action is now an accepted feature of the climate change regime, past experience with climate change action plans and policy formulation strongly suggests that differences in ambition will nonetheless pose a considerable obstacle for countries seeking to strengthen the global commitment to action going forward, as competitiveness concerns become a source of tension. Enhancing national climate change action and ensuring wide participation in global climate

change efforts will be key to limiting global temperature increase to well below 2°C. This is where border carbon adjustments can play an important role.

Border carbon adjustments are recognized as “second best” policy instruments. But in a world of unequal climate change policies, they have an edge over other approaches that address the same set of challenges. Introducing border carbon adjustments could pave the road for increased climate change ambition in imposing countries by leveling the playing field for domestic constituencies while also obviating the need for problematic policy approaches, such as the continued free allocation of emissions allowances. Likewise, their ability to leverage greater climate change engagement of trade partners could help discourage the free riding that has bedeviled past cooperation in response to climate change.

In a world where trade protectionism is already on the rise, the opportunity for additional trade measures has arguably increased. Using border carbon adjustments can, at least, ensure that any such measures are climate-smart.⁶¹ Properly designed and implemented through a fair and transparent process, border carbon adjustments could become a key companion to ambitious climate change policy as the world moves towards a zero-carbon future.

Notes

¹ See generally Harro van Asselt and Thomas Brewer, “Addressing Competitiveness and Leakage Concerns in Climate Policy: An Analysis of Border Adjustment Measures in the US and the EU,” *Energy Policy* 38, no. 1 (2010): 42–51.

² Trevor Houser, Britt Childs, Jacob Werksman, Rob Bradley, and Robert Heilmayr, *Leveling the Carbon Playing Field: International Competition and U.S. Climate Policy Design* (Washington, DC: Peterson Institute for International Economics/World Resources Institute, 2008): 33–34.

³ Frédéric Branger and Philippe Quirion, “Would Border Carbon Adjustments Prevent Carbon Leakage and Heavy Industry Competitiveness Losses? Insights from a Meta-Analysis of Recent Economic Studies,” *Ecological Economics* 99 (2014): 29–39.

⁴ Government of France, “Initiative pour l’Europe: Discours d’Emmanuel Macron pour une Europe souveraine, unie, démocratique,” September 28, 2017, <http://www.elysee.fr/declarations/article/initiative-pour-l-europe-discours-d-emmanuel-macron-pour-une-europe-souveraine-unie-democratique>.

⁵ Government of Mexico, “Intended Nationally Determined Contribution,” March 30, 2015, <http://www4.unfccc.int/submissions/INDC/Published%20Documents/Mexico/1/MEXICO%20INDC%2003.30.2015.pdf>.

⁶ Ben Garside, “Canada’s Environment Minister Calls for Consideration of Carbon Border Measures,” *Carbon Pulse*, October 11, 2017.

⁷ Sander de Bruyn, Thomas Huigen, and Ellen Schep, *Calculation of Additional Profits of Sectors and Firms from the EU ETS 2008-2015* (Delft: CE Delft, 2016): 3.

⁸ Michael Mehling, Harro van Asselt, Kasturi Das, Susanne Droege, and Cleo Verkuijl, *Designing Border Carbon Adjustments for Enhanced Climate Action* (London: Climate Strategies, 2017): 41.

⁹ GATT, “Border Tax Adjustments: Report of the Working Party,” GATT Doc. L/3464, December 2, 1970, para. 4.

¹⁰ Aaron Cosbey ed., *Trade and Climate Change: Issues in Perspective* (Winnipeg, MB: International Institute for Sustainable Development, 2008): 20.

¹¹ Joanne Scott, “Extraterritoriality and Territorial Extension in EU Law,” *American Journal of Comparative Law* 62, no. 1 (2014): 87–126

¹² See generally Karsten Neuhoff, Roland Ismer, William Acworth, Andrzej Ancygier, Carolyn Fischer, Manuel Haussner, Hanna-Liisa Kangas, Yong-Gun Kim, Clayton Munnings, Anne Owen,

Stephan Pauliuk, Oliver Sartor, Misato Sato, Jan Stede, Thomas Sterner, Michael Tervooren, Ruud Tusveld, Richard Wood, Zhang Xiliang, Lars Zetterberg, and Vera Zipperer, *Inclusion of Consumption of Carbon Intensive Materials in Emissions Trading: An Option for Carbon Pricing Post-2020* (London: Climate Strategies, 2016).

¹³ William Nordhaus, “Climate Clubs: Overcoming Free-Riding in International Climate Policy,” *American Economic Review* 105, no. 4 (2015): 1339-70.

¹⁴ Eswaran Somanathan, Thomas Sterner, and Taishi Sugiyama, “National and Sub-National Policies and Institution,” in *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. O. Edenhofer et al. (Cambridge, UK: Cambridge University Press, 2014): 1163. See also John Ward, Paul Sammon, Guy Dundas, Grzegorz Peszko, Pauline Maree Kennedy, Sebastian Wienges, Nicolai Prytz, *Carbon Leakage: Theory, Evidence and Policy Design* (Washington, DC: Partnership for Market Readiness, 2015).

¹⁵ Stéphanie Monjon and Philippe Quirion, “Addressing Leakage in the EU ETS: Border Adjustment or Output-based Allocation?” *Ecological Economics* 70, no. 11 (2011): 212.

¹⁶ Christopher L. Weber and Glen P. Peters, “Climate Change Policy and International Trade Policy Considerations in the US,” *Energy Policy* 37, no. 2 (2009): 432–40.

¹⁷ Aaron Cosbey and Peter Wooders, “A Guide for the Concerned: Guidance on the Elaboration and Implementation of Border Carbon Adjustment,” *ENTWINED Policy brief No. 3* (Stockholm: ENWINED Network, 2012): 13, https://www.iisd.org/pdf/2012/bca_guidance.pdf.

¹⁸ Branger and Quirion, “Would Border Carbon Adjustments Prevent Carbon Leakage and Heavy Industry Competitiveness Losses? Insights from a Meta-Analysis of Recent Economic Studies,” 29–39.

¹⁹ Carolyn Fischer and Alan K. Fox, “Comparing Policies to Combat Emissions Leakage: Border Carbon Adjustments versus Rebates,” *Journal of Environmental Economics and Management* 64, no. 2 (2012): 212.

²⁰ European Commission, “Draft EU ETS Revision Directive (unofficial),” (on file with authors).

²¹ Van Asselt and Brewer, “Addressing Competitiveness and Leakage Concerns in Climate Policy: An Analysis of Border Adjustment Measures in the US and the EU,” 47–48.

²² Mehling, van Asselt, Das, Droege, and Verkuil, “Designing Border Carbon Adjustments for Enhanced Climate Action.”

²³ Antto Vihma and Harro van Asselt, *The Conflict over Aviation Emissions: A Case of Retreating EU Climate Leadership?* Briefing Paper 150 (Helsinki: Finnish Institute of International Affairs, 2014).

²⁴ Senate of the Republic of Italy. “XVII Legislatura: Risoluzione delle Commissioni riunite 10a e 13a approvata a conclusione dell'esame dell'affare assegnato sulle asimmetrie competitive per l'industria europea derivanti dai bassi costi energetici e dai bassi standard ambientali in Paesi extra-UE.” Document XXIV No. 79. Aug. 1, 2017. <http://www.senato.it/service/PDF/PDFServer/BGT/1040156.pdf>

²⁵ Mehling, van Asselt, Das, Droege, and Verkuil, “Designing Border Carbon Adjustments for Enhanced Climate Action,” 33–34.

²⁶ James A. Baker, III, Martin Fledstein, Ted Halstead, N. Gregory Mankiw, Henry M. Paulson, Jr., George P. Shultz, Thomas Stephenson, and Rob Walton, *The Conservative Case for Carbon Dividends* (Washington, DC: Climate Leadership Council, 2017).

²⁷ See, e.g., “India Threatens WTO Case against Proposed ‘Carbon Border Taxes,” *Bridges*, March 31, 2010 and “Obama Criticises Border Tax Adjustments in House Climate Bill,” *Bridges*, July 1, 2009. For a legal critique of the first European proposal for border adjustments, see Reinhard Quick, “Border Tax Adjustment’ in the Context of Emission Trading: Climate Protection or ‘Naked’ Protectionism,” *Global Trade and Customs Journal* 3, no. 5, 163–75.

²⁸ See generally Ross Astoria, “Design of an International Trade Law Compliant Carbon Border Tax Adjustment,” *Arizona Journal of Environmental Law and Policy* 6 (2015): 491–534; Javier de Cendra, “Can Emissions Trading Schemes be Coupled with Border Tax Adjustments? An Analysis vis-à-

vis WTO Law,” *Review of European Community and International Environmental Law* 15, no. 2 (2006): 131–45; Brian Flannery, Jennifer Hillman, Jan Mares, and Matthew Porterfield, *Framework Proposal for a US Upstream Greenhouse Gas Tax with WTO-Compliant Border Adjustments* (Washington, DC: Resources for the Future, 2018); Kateryna Holzer, *Carbon-Related Border Adjustment and WTO Law* (Cheltenham, UK: Edward Elgar, 2014); Ismer and Neuhoff, “Border Tax Adjustment: A Feasible Way to Support Stringent Emission Trading,” 137–64; Joost Pauwelyn, *U.S. Federal Climate Policy and Competitiveness Concerns: The Limits and Options of International Trade Law*, Nicholas Institute for Environmental Policy Solutions, Working Paper (Durham, NC: Nicholas Institute for Environmental Policy Solutions, 2007); Ludivine Tamiotti, “The Legal Interface between Carbon Border Measures and Trade Rules,” *Climate Policy* 11, no. 5 (2011): 1202–1211; Steven N. Zane, “Leveling the Playing Field: The International Legality of Carbon Tariffs in the EU,” *Boston College International and Comparative Law Review* 34, no. 1 (2011): 199–225.

²⁹ https://www.wto.org/english/res_e/publications_e/ai17_e/gatt1994_art2_gatt47.pdf

³⁰ GATT, “Border Tax Adjustments: Report of the Working Party.”

³¹ GATT, “United States—Taxes on Petroleum and Certain Imported Substances,” report of the Panel, WTO Doc. L/6175 - 34S/136, adopted on June 17, 1987, paras. 2.5 and 5.2.4.

³² WTO, “European Communities—Measures Affecting Asbestos and Asbestos-Containing Products,” Appellate Body Report, WTO Doc. WT/DS135/AB/R, April 5, 2001, para. 101.

³³ Ismer and Neuhoff, “Border Tax Adjustment: A Feasible Way to Support Stringent Emission Trading,” 148.

³⁴ https://www.wto.org/english/docs_e/legal_e/gatt47_01_e.htm#articleI

³⁵ Joost, “U.S. Federal Climate Policy and Competitiveness Concerns: The Limits and Options of International Trade Law,” 32.

³⁶ WTO, “U.S.—Import Prohibition of Certain Shrimp and Shrimp Products—Recourse to Article 21.5 of the DSU by Malaysia,” Appellate Body Report, WTO Doc. WT/DS58/AB/RW, November 21, 2001, para. 136.

³⁷ Holzer, “Carbon-Related Border Adjustment and WTO Law,” 156.

³⁸ Holzer, “Carbon-Related Border Adjustment and WTO Law,” 156.

³⁹ Gary C. Hufbauer, Steve Charnovitz, and Jisun Kim, *Global Warming and the World Trading System* (Washington, DC: Peterson Institute for International Economics, 2009), 68–69.

⁴⁰ WTO, “U.S.—Import Prohibition of Certain Shrimp and Shrimp Products—Recourse to Article 21.5 of the DSU by Malaysia,” Appellate Body Report, WTO Doc. WT/DS58/AB/RW, November 21, 2001, para. 144.

⁴¹ WTO, “U.S.—Import Prohibition of Certain Shrimp and Shrimp Products—Recourse to Article 21.5 of the DSU by Malaysia.”

⁴² Joost, “U.S. Federal Climate Policy and Competitiveness Concerns: The Limits and Options of International Trade Law,” 4.

⁴³ WTO, “U.S.—Import Prohibition of Certain Shrimp and Shrimp Products—Recourse to Article 21.5 of the DSU by Malaysia.”

⁴⁴ WTO, “U.S.—Import Prohibition of Certain Shrimp and Shrimp Products—Recourse to Article 21.5 of the DSU by Malaysia.”

⁴⁵ This section draws on our earlier work in Harro van Asselt, *The Fragmentation of Global Climate Governance: Consequences and Management of Regime Interactions* (Cheltenham, UK: Edward Elgar, 2014).

⁴⁶ Julia Reinaud, *Issues Behind Competitiveness and Carbon Leakage: Focus on Heavy Industry* (Paris: OECD/International Energy Agency, 2008), 94–95.

⁴⁷ Christoph Böhringer, Edward J. Balistreri, and Thomas F. Rutherford, “The Role of Border Carbon Adjustment in Unilateral Climate Policy: Overview of an Energy Modeling Forum Study (EMF 29),” *Energy Economics* 34, Supplement 2 (2012): 97–110.

⁴⁸ Organisation for Economic Co-operation and Development (OECD), *Effective Carbon Prices*, (Paris: OECD, 201), 12; Böhringer, Carbone, and Rutherford, “Unilateral Climate Policy Design: Efficiency and Equity Implications of Alternative Instruments to Reduce Carbon Leakage,” 208–17.

⁴⁹ Cosbey and Wooders, “A Guide for the Concerned: Guidance on the Elaboration and Implementation of Border Carbon Adjustment,” 13.

⁵⁰ Samuel Kortum and David Weisbach, “The Design of Border Adjustments for Carbon Prices,” *National Tax Journal* 70, no. 2 (2017): 421–46, 439–40; Joost, “U.S. Federal Climate Policy and Competitiveness Concerns: The Limits and Options of International Trade Law,” 4.

⁵¹ Cosbey and Wooders, “A Guide for the Concerned: Guidance on the Elaboration and Implementation of Border Carbon Adjustment,” 14.

⁵² Jennifer Hillman, *Changing Climate for Carbon Taxes: Who’s Afraid of the WTO?* (Washington, DC: German Marshall Fund of the United States, 2013), 8.

⁵³ Cosbey and Wooders, “A Guide for the Concerned: Guidance on the Elaboration and Implementation of Border Carbon Adjustment,” 16.

⁵⁴ Sofia Persson, *Practical Aspects of Border Carbon Adjustment Measures: Using a Trade Facilitation Perspective to Assess Trade Costs*, Issue Paper No. 13 (Geneva: International Centre for Trade and Sustainable Development, 2010).

⁵⁵ Mehling, van Asselt, Das, Droege, and Verkuijl, *Designing Border Carbon Adjustments for Enhanced Climate*, 47.

⁵⁶ Michael Grubb, “International Climate Finance from Border Carbon Cost Levelling,” *Climate Policy* 11, no. 3 (2011): 1050–57.

⁵⁷ Warwick J. McKibbin, Adele C. Morris, Peter J. Wilcoxon, and Weifeng Liu, “The Role of Border Carbon Adjustments in a U.S. Carbon Tax,” *Climate Change Economics* 9, no. 1 (2018), <http://dx.doi.org/10.1142/S2010007818400110>.

⁵⁸ Böhringer, Balistreri, and Rutherford, “The Role of Border Carbon Adjustment in Unilateral Climate Policy: Overview of an Energy Modeling Forum Study (EMF 29),” 97–110.

⁵⁹ Persson, *Practical Aspects of Border Carbon Adjustment Measures: Using a Trade Facilitation Perspective to Assess Trade Costs*.

⁶⁰ Gernot Wagner, *But Will the Planet Notice? How Smart Economics Can Save the World* (New York, NY: Hill and Wang, 2011), 201.

⁶¹ Michael Mehling, Harro van Asselt, Kasturi Das, and Susanne Droege, “Beat Protectionism and Emissions at a Stroke,” *Nature* 559 (2018): 321–24.