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Toward a club of carbon markets

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Abstract This paper proposes the creation of a club of carbon markets (CCM), to promote deep reductions in greenhouse gas emissions by supporting the development, harmonization, and increased ambition of domestic carbon markets. To achieve its aims, the club would establish common or reciprocal standards for environmental market infrastructure, transparency and environmental integrity; offer mutual recognition of members' emissions units; allow participating jurisdictions to share experience and gain assistance in building institutional capacity; and promote domestic and cross-border investment in low-carbon development. Using a suite of incentives, including some from the trade arena, a club of carbon markets could serve as a powerful attractive nucleus for broadening the participation of jurisdictions in climate mitigation, much as the General Agreement on Tariffs and Trade (GATT) served as the nucleus for broadening trade in products and services. A carbon markets club could be launched under UNFCCC auspices, but a more promising avenue might be to pursue the creation of the CCM as a complement to but outside the UN talks.

1 Introduction

With the impacts of climate change already evident and atmospheric concentrations of greenhouse gases continuing to rise, the scientific and economic case for climate action is overwhelming (IPCC 2014). Because it is a global challenge, international cooperation to curb emissions is needed. Indeed, an extensive climate change "regime complex" has emerged comprising a wide range of initiatives and institutions aimed at reducing emissions (Keohane

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and Victor 2011), including the United Nations Framework Convention on Climate Change (UNFCCC), ratified by 196 countries; "minilateral" efforts such as the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants, launched in 2012, with 45 country partners and 56 non-state partners; and bilateral efforts such as the November 2014 United States-China announcement.

Yet these efforts have yielded neither emission reductions nor climate finance at the scale and pace required. While a growing number of jurisdictions are implementing emission trading programs to cap and reduce greenhouse gas emissions, no part of the current regime complex has capitalized on these efforts to promote the broader expansion and coordination of such policies. It is a premise of this paper that mobilizing markets much more broadly, through well-designed emission trading programs that place durable, declining limits on emissions, will be critical to drive large-scale emissions reductions, spur the development and deployment of clean technologies, and channel necessary investment into low carbon development.

To that end, we propose a club of carbon markets (CCM).[1] The club's goal would be to promote deep reductions in emissions by supporting the development, harmonization, and increased ambition of domestic carbon markets, including in fast-growing economies. Members would establish harmonized or reciprocal standards for monitoring and reporting emissions, accounting, transparency, and environmental integrity; create a shared market infrastructure to support the mutual recognition of emissions units; share experience and cooperate in building institutional capacity; and work jointly to further the ability of these markets to promote domestic and cross-border investment in low-carbon technologies.

Our proposal joins a rich and growing literature on plurilateral climate governance in a fragmented or "bottom-up" world.[2] Within that literature, a number of commentators have contemplated linking carbon markets.[3] What distinguishes our proposal is the focus on carbon markets as a means of boosting ambition and participation in climate action, and the close attention to the formation of a plurilateral club to foster them. [4]

While club members would enjoy the intrinsic benefits of linkage, we see the CCM as much more than a set of linking arrangements. We envision a CCM in the mold of plurilateral institutions, in areas such as trade and security, which jurisdictions have joined because the benefits of membership justified the disciplines that membership imposed. Just as the General Agreement on Tariffs and Trade (GATT) served as the nucleus for broadening participation and ambition in the multilateral system of trade in products and services, the CCM could serve as a crucial and powerful attractive nucleus for broadening participation and ambition in climate mitigation.

By establishing a stable institutional structure with harmonized rules and procedures, the CCM could provide greater incentives for climate policy durability over time and encourage greater investment in low-carbon development in participating jurisdictions. Through mutual provision of technical support and capacity-building, along with a ready-made market infrastructure, the CCM could reduce new members' transactions costs in setting up emission trading programs. The reputational benefits of membership could provide incentives for newly

[1] We use the term "carbon markets" to refer generally to greenhouse gas emissions trading (or "cap and trade") programs.

[2] See, e.g., Van Asselt (2014), Victor (2007, 2013), Stewart et al. (2013), Oppenheimer and Petsonk (2004), and Pizer (2007).

[3] For early focus on markets, see Stewart et al. (1996, UNCTAD/GDS/GFSB/Misc.1); UNCTAD (1996, UNCTAD/GDS/GFSB/Misc.2). For more recent discussion of linking emission trading systems, see, e.g., Bodansky et al. (2014); Green et al. (2014).

[4] Prof. William Nordhaus has recently proposed a similar "carbon pricing club" approach for harmonized carbon taxes (Nordhaus 2015).

joining jurisdictions to be more ambitious in their mitigation efforts. And perhaps most importantly, since club members would have an incentive to ensure credible carbon "currencies" among participants and avoid "carbon inflation," the CCM could generate mutual pressure for greater ambition in future commitments.

Although in principle a CCM could be formed inside the UNFCCC, creating the club outside the UN climate talks would likely be nimbler and more efficient, and could invite participation not only by national and regional jurisdictions, but also subnationals (e.g. states and provinces). The relevant qualification would be a jurisdiction's capacity to ensure compliance with its domestic emissions limits and required carbon market infrastructure.

While a club approach appears to be a more promising avenue than the UNFCCC for plurilateral cooperation on carbon markets—and indeed for greater ambition on climate—it is not a panacea. Each carbon market must first learn to "walk" before it can "run," let alone run a relay race; particularly in developing countries, the initial focus must be on building institutional capacity to implement markets successfully, rather than quickly attempting to link with other markets. Differences in jurisdiction-specific political, financial, regulatory, technical, and cultural contexts will complicate club formation. Despite these obstacles, however, it would surely be easier to reach agreement on the infrastructure and standards for a common carbon market among the subset of jurisdictions with a keen interest in carbon markets. With over 50 jurisdictions implementing or beginning to implement carbon markets, such a club's time may have arrived.

The next section briefly reviews the rationale for our focus on carbon markets. Section 3 presents key functions and provisions of a CCM. Section 4 considers participation and incentives: who would join, and why? Section 5 explores antecedents, drawing particularly on trade and security. Section 6 explores the potential relationship of the CCM to the UNFCCC. Section 7 concludes.

2 Why carbon markets

The economic rationale for market-based instruments, including emission trading, is well-established (Baumol and Oates 1988). Market-based instruments are cost-effective: in theory, they achieve a given level of emissions reduction at least cost. By putting a price on emissions (whether directly as a tax or fee, or indirectly through an emissions market), market-based instruments force individual actors to internalize the cost of their pollution, which would otherwise be external to their decision-making. These instruments give all polluters an economic incentive to reduce emissions, spurring innovators to come up with better, cheaper, faster ways of reducing emissions, and rewarding less and less pollution. And systems that allow firms to "bank" reductions for later use provide an incentive for early reductions.

A standard result from economic theory is that if the benefits and costs of abatement were known and fixed, "price" instruments (such as carbon taxes) and "quantity" instruments (emission trading) would be essentially equivalent; a robust academic economics literature considers the theoretical case when abatement costs are uncertain (Weitzman 1974; Newell and Pizer 2003; but see Keohane 2009).

Practical experience, meanwhile, suggests a number of advantages for emission trading over a carbon tax, especially in a "bottom-up" international context.[5] Climate policy objectives are often framed in terms of limiting emissions, facilitating their translation into quantity

[5] Keohane 2009. See also Wiener (1999).

targets (caps). Emission trading also provides a readier basis for cost-effective emissions reductions in a "bottom-up" world. Efficient allocation of abatement effort requires that the marginal abatement cost—that is, the cost of the last ton of emissions reduction—be equal across jurisdictions. (Otherwise, the same amount of abatement could be achieved at lower cost by shifting effort from high-marginal-cost jurisdictions to those with lower marginal costs.) Under emission trading, this "equimarginal" condition can be achieved directly, through linking: trading will equate the carbon price, and therefore the marginal abatement cost, across any two fully-integrated, linked markets (in the absence of exogenously introduced limits on trading). In contrast, equalizing the marginal abatement cost in a tax system requires explicit coordination—"top-down" multilateral negotiation—to set a common tax. Such coordination has been unavailing even in the economically integrated European Union.

Emission trading systems have worked well in practice. Perhaps the best-studied market-based policy is the U.S. sulfur dioxide trading program created by the 1990 Clean Air Act Amendments (Ellerman et al. 2000); other successful applications include the phasedown of leaded gasoline in the United States (Newell and Rogers 2007), the control of nitrous oxides in the eastern U.S.,[6] and the implementation of the Montreal Protocol on the Ozone Layer (Stavins 2003). More recently, the European Union's Emission Trading System (EU-ETS) has achieved its targets and successfully reduced emissions, although a deep recession, a host of complementary energy policies, and the lack of demand from other jurisdictions for offset credits has contributed to lower-than-expected allowance prices (Convery and Redmond 2013). Meanwhile, California's carbon market has performed well since it began operating in 2013, and has established a linkage with Quebec. All told, more than 50 national and subnational jurisdictions with nearly one billion inhabitants have launched emission trading programs.[7]

The experience of the 1997 Kyoto Protocol is instructive—both for its failings and for its positive lessons. The Protocol placed legally binding caps on the emissions of more than thirty industrialized countries for the years 2008–2012 and established international market-based flexibility mechanisms to aid their achievement. The Protocol's failure to include all major emitters under its emissions caps, and the hurdles it erected to broadening participation, contributed to opposition in the U.S. Senate (it was never submitted to that body for consent to U.S. ratification), and ultimately undermined its effectiveness in reducing global emissions.

Nonetheless, the Protocol provided positive lessons on policy design. Key system design elements,[8] many of which are also incorporated in the EU-ETS, include:

- Absolute, legally binding multi-year emissions budgets;
- Transactions limited to approved types of emissions units;
- Standardized, serialized, vintaged, fungible emissions units denominated in tonnes of CO2-eq;
- Transparent reporting of emissions;
- Transparent tracking and reporting of emission unit transactions, including explicit requirements that transfers of emissions allowances be subtracted from the transferor's emissions budget account and added to the transferee's;
- Accountability for emissions as compared with units held;

[6] See United States Environmental Protection Agency, "NOx Budget Trading Program," http://www2.epa.gov/airmarkets/nox-budget-trading-program.

[7] The jurisdictions include the 28 Member States of the EU plus Norway, Lichtenstein, and Iceland; Switzerland; New Zealand; Kazakhstan; Korea; California; Quebec; the nine states in the Regional Greenhouse Gas Initiative; Tokyo; and seven Chinese cities and provinces with pilot emission trading systems in place.

[8] See, e.g., Dudek et al. (1998).

- "Banking," i.e., the ability to carry surplus reductions forward from one commitment period to a subsequent period; and
- Stringent, specified consequences for non-compliance.

While the Kyoto Protocol was the archetype of a "top-down" multilateral climate treaty, these design features holds useful lessons for market-based policies in a "bottom-up" world.

3 A new infrastructure: forming the club of carbon markets

In a "bottom-up" climate architecture, individual jurisdictions establish their own domestic climate policies, including emission trading programs. A core purpose of the CCM would be to fulfill the functions necessary to link carbon markets across member jurisdictions, encourage new jurisdictions to join, and ultimately increase ambition. In particular, the CCM would need to create the conditions for mutual recognition of emission units among members; maintain the market infrastructure necessary for trading; establish clear criteria for membership; and inform assessments of mitigation effort and ambition among prospective and current members.

3.1 Mutual recognition on the basis of harmonized standards

At the core of the CCM would be mutual recognition of carbon emissions units among members. By joining the CCM, each jurisdiction would agree to allow entities with compliance obligations under its domestic carbon market to meet those obligations using emission units issued by any other member jurisdiction in good standing.

To promote the fungibility of emission units, the CCM would establish and maintain harmonized standards among its members. For example, the CCM would provide a common emissions accounting framework to ensure that "a tonne is a tonne," including mutually agreed procedures for monitoring, reporting, and verification (MRV) of emissions. The CCM would also ensure the harmonization of rules governing the creation and use of "offset credits" for verified reductions outside of capped sectors.

Mutual recognition need not require that members adopt identical regulations. Even California and Quebec, which have linked their markets to an unprecedented degree, are developing separate offset protocols. To ensure flexibility while also providing clear guidelines, club members might agree on a "minimum list" of regulatory design features or parameters that were essential for membership; a "negative list" of design features or parameters that would be ruled out; a "positive list" of features that would be automatically accepted; and perhaps a final category of design features that would require case-by-case judgment by existing members based on an agreed set of high-level principles.

The CCM could provide routine, periodic review of member jurisdictions to ensure that they observed the agreed standards and guidelines. Such a review process could draw on precedents for policy surveillance in the IMF, OECD, and other institutions (Aldy 2014). Anticipating that political and economic circumstances might alter the willingness of member jurisdictions to stay in the CCM, the CCM would also need to identify rules for exit, including the treatment of banked allowances. [9]

[9] See Pizer and Yates (2014).

3.2 A shared carbon market infrastructure

A second core function of the CCM would be to maintain the shared carbon market infrastructure necessary for trading. Thus the CCM would establish either a common registry of emissions units, or a formal means of communication among member registries, in order to facilitate the tracking of emissions units from their creation (either as allowances under a cap or as offset credits) to their retirement. To avoid "double-claiming" of reductions, the CCM would establish double-entry bookkeeping rules to ensure that all units, whether offset credits or allowances, transferred from one jurisdiction, are subtracted from the transferor's unit account.

In addition, the CCM (or a third party designated by the CCM to act on behalf of its members) could perform other market functions such as administering common allowance auctions, maintaining allowance accounts for regulated entities, and even overseeing and operating a "reserve" of allowances to be released into the market if prices rise above certain thresholds.

While these functions could in principle be provided through bilateral linkages, the CCM would take advantage of economies of scale in establishing a common carbon market infrastructure.

3.3 Criteria for membership

Since the CCM would not be a treaty, participants could include sub-national jurisdictions such as states and provinces, as well as nations. The key requirement would not be "capacity to treat" but capacity to administer a market—i.e., establish an emissions cap, issue and accept emissions units, require compliance, and penalize non-compliance.

Minimum eligibility criteria for membership in the CCM could include:

- Emission targets defined as emissions budgets over some minimum duration, e.g. a decade, covering all or a significant portion of a jurisdiction's emissions of one or more greenhouse gases, denominated in tonnes of CO2 or CO2-eq.;
- The use of emission trading to meet the cap;
- Jurisdictional law requiring covered entities to comply; clear, sufficient penalties for non-compliance; and institutional capacity to enforce the cap; and
- A commitment to transparent monitoring, reporting, and verification of emissions and transactions.

That the CCM would not be structured as a formal treaty might also increase the potential for eventual U.S. participation. In the postwar period from 1946 to 2006, 94 % of international agreements negotiated by the United States were "executive agreements," implemented under existing authorities and never submitted to the Senate for advice and consent under Article II of the Constitution (Krutz and Peake 2009). In line with this trend, U.S. participation (including by U.S. states) might be more likely if a CCM were constituted not as a treaty, but as a voluntary association among jurisdictions with the capacity to administer their own internal markets, specifying obligations congruent with authorities afforded to the U.S. Executive Branch and the U.S. states by virtue of the Constitution and already-enacted legislation.

3.4 Mitigation effort and ambition

To assure the environmental integrity of emissions units, CCM members would need to tackle the thorny challenge of assessing the stringency of each other's emission caps—both at the time a prospective member applied to join (or, for founding members, at the time of the CCM's creation), and periodically thereafter to ensure that participating jurisdictions remained "in good standing."

For prospective members, a natural approach might be to conduct a case-by-case review (and negotiation) of the emission targets proposed by the jurisdiction, much as applicants to the WTO must negotiate a schedule of tariff bindings.[10] Another model of case-by-case review is the process established by the UNFCCC's 2013 Warsaw Framework for Reducing Emissions from Deforestation and Degradation (REDD), under which Parties may propose REDD reference levels, submit those for independent technical expert review, and respond to the published results of the review. In either case, the CCM could oversee the process of gathering and disseminating information on prospective members. Information relevant to an assessment of ambition would include mitigation policies and accounting rules, including the treatment of direct and indirect emissions from capped sectors and procedures to address potential emissions leakage. To encourage broad membership, the CCM might offer consultations to jurisdictions whose initial applications were rejected.

Once having joined, member jurisdictions could be subject to periodic assessments to ensure that they maintained or increased the ambition of their targets, as part of the routine policy surveillance mentioned above. Such a routine review would help to guard against the perverse incentive that might otherwise exist for jurisdictions—having linked with each other—to loosen their targets in order to improve their emission units "balance of trade."[11]

To help inform both *ex ante* and *ex post* reviews, the CCM might develop a set of metrics for assessing "comparability of effort." A range of approaches has been suggested in the literature, including evaluating targets on the basis of percentage reductions below historical or projected baselines, taking into account differing national circumstances; comparing targets to modeled emission trajectories consistent with a specified level of overall ambition; and estimating mitigation costs.[12]

4 Incentives to participate

Crucial to the effectiveness of the CCM approach is the creation of incentives to encourage jurisdictions to join—and having joined, to comply with the obligations of membership. We envision the CCM as a true "club" in the economic sense: that is, a voluntary group whose members share a set of benefits from which non-members are excluded (Buchanan 1965).

4.1 Benefits from linkage

By enabling trading of carbon units among a set of jurisdictions, the CCM would secure a range of benefits associated with linkage, including lower overall abatement costs (the

[10] See World Trade Organization, *Handbook on Accession to the WTO*, chapter 4, https://www.wto.org/english/thewto_e/acc_e/cbt_course_e/c4s6p1_e.htm.
[11] See, e.g., Green, Sterner, and Wagner, *supra*.
[12] See, e.g., Aldy and Pizer (2014); Aldy et al. (2015); and Climate Action Tracker, http://climateactiontracker.org/indcs.html.

broader trading area provides greater heterogeneity, lowering the cost of emissions reductions), potentially greater price stability (assuming that price shocks are at least partially uncorrelated across jurisdictions), and greater market liquidity. These benefits are likely to be particularly attractive for "small" jurisdictions, or those dominated by a handful of emitters. While a small economy could face significant allowance price uncertainty in an independent domestic market, it could be more certain of prices with plurilateral linkages. Access to a larger market could also be significant for jurisdictions with only a handful of major emitters. For example, South Africa's public utility, Eskom, generates over 90 % of the country's electricity—making it a near-monopolist in South Africa, but a price taker in a potential CCM.[13]

As in any trade relationship, other benefits of linkage would vary. Jurisdictions with relatively abundant low-cost abatement opportunities would value the access to jurisdictions where demand for those is strong. At the same time, higher-cost jurisdictions might be attracted by the opportunity to meet compliance obligations by financing lower-cost abatement opportunities elsewhere—while being assured by the cap that the resulting emissions reductions would be "real and additional."

4.2 Reduced barriers to policy adoption

The CCM could help prospective and existing members by lowering barriers to establishing carbon markets or improving the efficacy of existing systems. Jurisdictions with less experience in designing and implementing environmental markets could access capacity-building assistance, technical expertise and analytical support. Jurisdictions without capacity or infrastructure to meet CCM membership criteria might be able to gain recognition as "Observer" or "Affiliated" members with the intention of joining later.

4.3 Enhanced transparency and MRV

Scholars have long highlighted the need for transparent and rigorous monitoring, reporting, and verification (MRV) of emissions. Improved MRV helps jurisdictions understand the scope of the climate challenge, develop strategies to address it, and assess the extent to which policy interventions are succeeding. Robust MRV boosts public and private actors' confidence in low-carbon investment—particularly when supported with a long-term governmental commitment to keep reducing emissions.

The CCM could offer policy and technical support to improve members' and prospective members' domestic MRV. Such assistance would be in the self-interest of all members, since it would bolster market integrity, enhancing the value of club membership (even for those not receiving such support). Again, useful analogs can be found in the work of the IMF and WTO to assist members in building technical capacity and improving standards for data collection and analysis.[14]

[13] Republic of South Africa National Treasury, "South Africa's Policy Interaction Experience," Presentation to the Partnership for Market Readiness (March 2013), www.thepmr.org/system/files/documents/Policy%20Mapping%20II_South%20Africa_0.pdf

[14] See Aldy, "The crucial role of policy surveillance in international climate policy," *supra.*

4.4 Information exchange, institutional capacity-building, and policy coordination

Visits to observe market infrastructure and implementation, periodic membership meetings, and other information-sharing programs would enable CCM members to share experiences and deepen market ties. Prospective members might be invited to participate in some of these, which might also be facilitated by coordination with other complementary capacity building initiatives, including the World Bank's Partnership for Market Readiness.

4.5 Enhanced access to low-carbon investment capital

CCM membership could help participating jurisdictions attract low-carbon investment. That is because the key entry requirement for CCM membership—a well-designed cap and trade program—also enhances the returns from investments in emissions reductions. Mutual recognition and fungibility of emission units could help participating firms access capital in other member jurisdictions and manage risk. CCM membership would also provide a strong signal not only of a jurisdiction's commitment to reducing emissions, but also its institutional capacity to provide a stable environment for low-carbon investment. Indeed, political leaders focused on strengthening climate action might make membership a criterion for investment decisions by export–import banks, overseas development institutions, pension or sovereign wealth funds, or other large public investors.

4.6 Reputational benefits

Enhanced international recognition, strengthened strategic alliances, improved interaction with regional partners, greater credibility in economic transactions, or better negotiating leverage in the UNFCCC might motivate new jurisdictions to join the CCM.[15] Cultural and/or political affinities (e.g., the opportunity to learn from high-profile China or California carbon markets) might also lead jurisdictions to perceive it in their self-interest to join the CCM.

4.7 Safe harbor from potential trade measures on carbon-intensive products

Just as Parties to the Montreal Protocol on the Ozone Layer prohibited trade in ozone-depleting substances (ODS) with non-Parties, various jurisdictions that have adopted or are considering carbon emissions limits have considered how to address leakage of emissions. "Border carbon adjustments" (BCAs)—requiring importers of carbon-intensive products (e.g., steel or aluminum) from jurisdictions without comparable emissions limits to purchase emissions allowances comparable to those required for domestic producers—have been discussed in the EU and elsewhere, and were included in proposed U.S. climate legislation in 2009. While a number of technical issues would arise in determining the exact form of any BCA, a growing body of legal analysis argues that appropriately-designed BCAs could be consistent with WTO rules (Horn and Mavroidis 2010; WTO and UNEP 2009).

If jurisdictions with emissions limits decide to impose BCAs on carbon-intensive imports, they would likely make exceptions for jurisdictions with comparably stringent climate policies.

[15] See Hathaway (2007); Rose and Spiegel (2009).

In such a scenario, it would be natural for CCM members to exempt each other from BCAs, on the grounds that participation in the CCM met the condition of "comparability." Such safe harbor could represent a powerful additional "club benefit" to joining the CCM. And as the CCM expanded, it would not only increase trade in carbon emissions units and reduce cross-border leakage, but also contribute to freer trade in other goods and services by widening the circle of countries that could claim exemption from BCAs.

4.8 CCM secretariat

A small CCM secretariat might strengthen general coordination, facilitate exchange of information, and provide a clearinghouse for institutional capacity-building. Considering analogies in the trade field among others, the secretariat might also house analytical capacity to undertake expert review of the policies in member jurisdictions, facilitate access to independent expertise, assess conformance with the membership criteria, and promote transparency in monitoring, reporting, and verification. As the CCM developed, the secretariat might also facilitate deeper coordination among CCM members—for example through centralized transaction logs, model contracts, uniform contract codes, harmonized registries, shared "strategic allowance reserves" that could be tapped in the event of unexpectedly high prices, or common mechanisms for settling disputes.

4.9 Exclusion of non-members

To ensure that these benefits are exclusive to jurisdictions in the CCM "club," members would agree *not* to accept emission units from, or allow the transfer of units to, any jurisdiction outside of the CCM (unless all CCM members agreed to accept units from that jurisdiction). Such an approach would create strong incentives for jurisdictions with domestic market-based programs to conform to or exceed minimum CCM membership criteria, to attract greater interest in linkage and investment from other jurisdictions.

Again, the Montreal Protocol provides a model. Its Parties barred trade in ODS with non-Parties unless the non-Parties had adopted comparable measures. That provision created market-pull for more ratifications, better MRV, and a strong market force for the development of low-ODS alternatives (Petsonk 1990; See also Shepherd 2014)—exactly the dynamic that the CCM would seek to replicate in carbon markets.

Such a "free-trade area for carbon" should not raise any tensions with the WTO: we agree with the prevailing view that carbon emission units are neither products nor services and thus are not directly subject to WTO disciplines.[16]

5 Antecedents

The development of the CCM might draw on lessons from other plurilateral regimes. Here we draw three lessons for club development from the fields of trade and security.

[16] For a full discussion of the trade implications of our CCM proposal, see Keohane and Petsonk (2015). See also UNCTAD (1996, UNCTAD/GDS/GFSB/Misc. 2) at 11; Petsonk (1999).

5.1 First lesson: start small, and use market access as an attractant

"Start small" emerges from the history of the modern trade regime.[17] The origins of the GATT can be traced to the bilateral negotiations between the United States and the United Kingdom over the Atlantic Charter, issued in August 1941, and the Mutual Aid Agreement of the following year. In 1945, as part of negotiations on a postwar American loan, the two countries hammered out a joint commercial policy agreement on a range of issues including tariffs, subsidies, and import quotas, to serve as the basis for multilateral negotiations on tariff reductions. Following a suggestion by Canada, those negotiations were to start among a "nuclear" group of fifteen countries. In parallel, the U.S. proposed a larger UN conference to establish an International Trade Organization (ITO). By October 1947, the "nuclear" group—now numbering 23 countries, and meeting in Geneva—reached a General Agreement on Tariffs and Trade (GATT), even as they and others prepared to negotiate a charter for the larger organization. The failure of the United States to ratify the 1948 Havana Charter in effect doomed the ITO. But because the smaller GATT included provisions for it to take effect even if the ITO didn't, the GATT was able to form an economic nucleus, using market access to attract, over time, broad multilateral participation in trade liberalization and tariff reduction.

The "start small" theme also emerges in the development of the Missile Technology Control Regime (MTCR), which started in 1987 as an informal political agreement among G-7 countries to limit the risks of proliferation of weapons of mass destruction (WMD).[18] The MTCR provides guidelines for export license controls on missile and space technologies and products. Although the MTCR, being voluntary, lacks penalties for noncompliance, under U.S. law the U.S. government may (and in some cases must) impose sanctions on individuals, companies, or governments that export controlled items in violation of the guidelines. Sanctions include cutting off bilateral aid or arms sales for up to two years (Arms Control Association 2012). The MCTR has grown to some 34 members, with participating nations gravitating to it in part because of the perception that adherence brings market access.[19]

5.2 Second lesson: choose a legal architecture that facilitates participation

The GATT, as an "agreement" among "contracting parties" (rather than a treaty), could be implemented by the U.S. Executive Branch, using its existing legal authorities. While the GATT eventually provided the basis for the much broader and more formal WTO, it might never have gotten off the ground in the first place had it not enabled immediate U.S. participation by working within executive authorities. (The very broad Havana Charter likely would have necessitated Congressional action, but was never submitted to the Congress precisely because such approval was unlikely.) Similarly, the MTCR is an informal "understanding" based on voluntary participation, which allowed it to start promptly with U.S. participation and has facilitated broader membership since.

The history of both regimes thus suggests that a CCM could start promptly and attract eventual U.S. national participation if it were formed as a voluntary association of jurisdictions, with obligations that could be met by the U.S. Executive Branch under contemporaneous

[17] This discussion of the origins of the GATT draws on Irwin et al. (2009).

[18] We are indebted to Prof. Robert Keohane for suggestions on this section, and to Ms. Lindsay Brewer for research and suggestions. Materials in this section are drawn in part from MCTR Frequently Asked Questions, http://www.mtcr.info/english/FAQ-E.html.

[19] See Zaborsky (2004).

domestic law, and thus not require ratification under Article II of the U.S. Constitution. In the case of the CCM, such a voluntary approach would also facilitate a prompt start by allowing subnational jurisdictions to participate.

5.3 Third lesson: seek critical mass

The GATT 1947, and the MTCR, both started small but with a critical mass of relevant actors (producers and consumers) in their respective fields. That "critical mass" enabled them to exert further market pull to broaden membership. The recent history of multilateral trade negotiations offers similar lessons. In the trade arena, prior to 1994, trade negotiations proceeded along the approach of a "Single Undertaking", in which nothing is agreed until everything is agreed—multilaterally. (The UNFCCC largely follows that approach.) The result has been that in recent times, those least interested in trade liberalization have exercised hold-out power. Multilateral trade liberalization has sputtered. In contrast, more progress has been made through the WTO's *de facto* embrace of "less-than-all" agreements on information technology products, telecommunications, and financial services, where entry into force is contingent on accession by participants constituting "critical mass" (e.g. 90 % of covered trade.) These recent successes in trade negotiations demonstrate the power of starting small, while seeking critical mass.

The importance of reaching critical mass can be seen in environmental agreements as well. For example, the Montreal Protocol on the Ozone Layer, which froze and phased out consumption of ODS, entered into force when eleven nations representing two-thirds of global calculated ODS consumption had ratified the Protocol—making it economically unattractive for the remaining one-third of ODS consumers to ramp up their own production of ODS. Following this model, the CCM might focus on securing the participation of jurisdictions comprising a significant share (perhaps a majority?) of suppliers and demandeurs in extant cap-and-trade markets. The goal would be to limit the opportunity for a country outside the club to act as a large supplier of low-quality emission units, undermining the environmental integrity of the club.

6 The CCM and the UNFCCC

In principle, a CCM could be formed under the auspices of the UNFCCC, either through negotiations under the "Framework for Various Approaches" or by building on the 2014 decision of the Conference of the Parties to organize technical expert meetings to "[s]upport the accelerated implementation of policy options and enhanced mitigation action, including through international cooperation."[20] In this scenario, the UNFCCC itself could provide some of the functions of the CCM (e.g., a common market infrastructure), and might "take note" of a deeper plurilateral agreement on carbon markets reached by a subset of like-minded jurisdictions. In practice, however, the COP may not be able to agree more than minimal accounting standards to avoid double-claiming of transferred units.

Alternatively, the CCM could develop wholly outside the UNFCCC, as a free-standing building block that complements the UNFCCC's high-visibility platform. Here, the examples

[20] See "Market and Non-Market Mechanisms," UNFCCC, http://unfccc.int/cooperation_support/market_and_non-market_mechanisms/items/7551.php; Lima Call for Climate Action, Decision 1/CP.20 para. 19(a)(v) (December 2014).

of the GATT, which developed in parallel with efforts to create a larger, more ambitious International Trade Organization, and the MTCR, whose initial membership of seven countries has grown to more than 30, might be instructive. Building on these models, the convening could be done by states, jurisdictions, or non-state actors. It could build on efforts already undertaken by national and subnational jurisdictions, particularly those interested in market-based environmental policy.[21] The "platform for a strategic dialogue" on carbon markets included in the 2015 G7 Leaders' Communique could also provide a basis for initial discussions around a CCM.[22]

In turn, the CCM could facilitate both the achievement of members' UNFCCC mitigation obligations and the UNFCCC's transparency objectives. Since CCM membership would be conditional upon robust MRV commitments from members, the CCM would create strong incentives for jurisdictions with domestic market-based programs to ensure rigorous and transparent measurement and reporting in order to attract greater interest in linkage and investment from other jurisdictions.

6.1 Role of the UNFCCC in enhancing market coordination

Even if the CCM were formed outside of the Framework Convention, individual nations' ongoing work to draft, and later finalize, their post-2020 mitigation commitments as part of any Paris agreement could provide a boost to the CCM's genesis and illustrate a potential "middle way" forward. Buttressed by the technical expert meetings on international cooperative approaches established by the 2014 Lima Call for Climate Action, the submission of national commitments provides an opportunity for any market-interested country to indicate the preliminary criteria that external emission units must meet to be accepted for compliance in its domestic system. Such public transparency could also aid other nations keen to design their own compatible domestic systems, and thus could help guide the development and future membership of a carbon markets club. Indeed, among those "intended nationally determined contributions" for the post-2020 period submitted by June 2015, Switzerland, Mexico, Norway, and Lichtenstein indicated their desire to use carbon markets to fulfill their pledges and articulated preliminary criteria for emissions units they would consider eligible for trading.

Of course, the CCM would need to be consistent with Parties' obligations under the UNFCCC, including any agreement reached under UNFCCC auspices in Paris in 2015. The Paris talks, and the UNFCCC itself, will continue to have important roles to play. The UNFCCC gives a voice and standing to virtually every country in the world—even the least developed and most vulnerable—on a critical global issue. It also creates a platform (and an obligation) for countries to announce commitments, helping to drive ambition at the national level.[23]

[21] Examples include the International Carbon Action Partnership (ICAP) the Asia-Pacific Carbon Markets Roundtable; the "Under 2 MOU" initiative launched by the State of California; the Governors Forest and Climate Task Force C40 Cities Climate Leadership Group; and the World Bank's Partnership for Market Readiness.

[22] See https://www.g7germany.de/Content/DE/_Anlagen/G8_G20/2015-06-08-g7-abschluss-eng.pdf.

[23] The November 2014 U.S.-China joint climate announcement and September 2015 joint presidential statement both illustrate this dynamic. See "U.S.-China Joint Announcement on Climate Change," White House Office of the Press Secretary, https://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change; "U.S.-China Joint Presidential Statement on Climate Change," White House Office of the Press Secretary, https://www.whitehouse.gov/the-press-office/2015/09/25/us-china-joint-presidential-statement-climate-change.

In this context, it is important to note that UNFCCC Parties retain full authority to use domestic emissions markets to fulfill any commitments they might make. Moreover, existing UNFCCC provisions make clear that UNFCCC Parties also retain full authority to link their markets with similar markets created and administered by other Parties.[24] In other words, *no additional multilateral authority would be needed* for UNFCCC Parties to fulfill their commitments under a Paris agreement through a CCM.

7 Conclusion

Market mechanisms such as emission trading systems can play a key role in driving emissions reductions and low carbon investment at a scale and pace needed to meet the urgent challenge of climate change. To that end, this paper has proposed a new addition to the existing "regime complex" on climate change: a Club of Carbon Markets. By establishing a common market infrastructure based on mutual recognition of carbon emission units, with standards to promote transparency and environmental integrity, the CCM could facilitate ambitious emissions reductions and mobilize significant low-carbon investment. Properly designed, the CCM could attract participation by offering carbon market linkage, informational and reputational benefits, and increased trade and investment flows.

While the club could conceivably be formed under the auspices of the UNFCCC, it need not be. We envision the CCM emerging out of plurilateral agreement among carbon market jurisdictions, following the model of the GATT and recent arms control agreements. The CCM seeks to emulate a lesson from those and other examples: To encourage ambition and cooperation in the multilateral arena, create an institution that jurisdictions want to join.

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[24] See, e.g., UNFCCC Articles 3.3, 7.2(c), and 12.8, which expressly recognize Parties' sovereign right to cooperate to reduce emissions.

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