Does institutional proliferation undermine cooperation? Theory and evidence from climate change

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Abstract

Global politics has undergone a tremendous institutional proliferation, yet many questions remain about why states join these new institutions and whether they support cooperation. I build on existing work to develop a general theory of state participation in dense institutional environments that also helps to explain cooperative outcomes. I argue that states may be dissatisfied when cooperation proceeds either too slowly or too quickly and that these two types of dissatisfaction motivate opposing participation behaviors. Deepeners are states that are dissatisfied with the slow pace of cooperation and join institutions to support cooperation, while fragmenters are states dissatisfied with the quick pace and join institutions to undermine cooperation. I evaluate my argument using new data on 63 climate institutions and states' greenhouse gas mitigation targets in the Paris Agreement on Climate Change. I find that membership in climate institutions designed to facilitate implementation is associated with more ambitious targets, while membership in general is unrelated to targets.

Keywords international cooperation, international organizations, climate change, ideal point estimation

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1 Introduction

Global governance has changed dramatically since the creation of the post-World War Two Bretton Woods institutions. The state-centric, highly legalized, and multilateral model for governing transnational problems is giving way to alternative institutional designs (Abbott and Faude 2020). National governments now often sit alongside firms and non-governmental organizations; governance activities are frequently organized informally so as to be more adaptable, and the challenges are harder to solve (Hale et al. 2013). Perhaps the most dramatic change is that now international cooperation is rarely centralized in a single international organization, but is instead distributed across forums in increasingly dense institutional environments (Raustiala and Victor 2004; Alter and Meunier 2009). This institutional proliferation is especially apparent in international climate politics, where states had created over 60 institutions to address climate change by the time they adopted the Paris Agreement on Climate Change in 2015.[1] However, serious concerns remain about whether these new institutions contribute to or hinder effective climate cooperation.

Institutional proliferation refers to the rapid increase in the number of international institutions operating in an issue-area (Raustiala 2013). It has become widespread across global politics, from development finance (Kellerman 2019) to election monitoring (Kelley 2009) and climate change (Keohane and Victor 2011). This general phenomenon has provoked debates about how actors seek to shift sites of rule-making away from existing forums and toward new ones ("regime shifting"), how they may use their membership across forums to opportunistically select ones with more favorable institutional characteristics for their foreign policy goals ("forum shopping"), and overall how membership in institutions that overlap in their membership and functional scope may pull actors in opposing directions.

In this paper, I investigate how states use institutional proliferation to pursue their goals in global climate politics. By and large, there are two competing ideas about how institutional proliferation affects international cooperation. One school is concerned that states use institutional density to obstruct collective action, shirk their obligations, and ultimately undermine cooperation (Benvenisti and Downs 2007; Drezner 2013). However, others studies are more optimistic about states' abilities to separate governance across forums, establish complementarities, and ultimately use overlapping

[1]These institutions are discussed in section 3 and in the supplementary information. A full list of these institutions is available in the supplementary information as well.

institutions to support cooperation (Kelley 2009; Johnson and Urpelainen 2012). I argue that the key to resolving these debates lies in understanding states' motivations for participating across institutions in dense institutional environments. These motivations are more multifaceted than existing theories suggest.

Present research argues convincingly that institutional proliferation stems from dissatisfaction with cooperative outcomes in existing forums (Van de Graaf 2013; Morse and Keohane 2014; Lipscy 2017; Kellerman 2019). Institutional rules have distributional implications that create winners and losers (Graham and Serdaru 2020). Dissatisfied losers may use outside institutions to shape the evolution of cooperation in line with their interests. However, the key concept of dissatisfaction remains under-theorized. International climate politics highlights that states can be dissatisfied with institutional outcomes for opposing reasons. Some states are dissatisfied that cooperation under the United Nations Framework Convention on Climate Change (UNFCCC) moves too slowly and would rather cooperate at more deeply substantive levels. By contrast, other states fear the sovereignty costs of stringent mitigation and would rather move slower or not at all.

These opposing sources of dissatisfaction are emblematic of the distributive conflict that structures climate politics and informs states' climate behavior. Specifically, they condition state participation across climate institutions and states' climate policy targets. I argue that states that are dissatisfied with the slow pace of cooperative progress join climate institutions that focus on building national capacity to implement ambitious climate policies. They identify viable sub-topics of the broader climate problem and separate these out to be addressed in new climate institutions. I term these states *deepeners*, in reference to their efforts to drive climate action forward. By contrast, states that are dissatisfied with cooperative progress that proceeds too quickly join climate institutions focused on networking and negotiations. They challenge the centrality of the UNFCCC, articulate rival principles to structure climate politics, and convoke alternative constituencies that advocate weaker climate goals. I call these states *fragmenters*, in reference to their efforts to obstruct climate cooperation.

Deepeners and fragmenters may both participate extensively across climate institutions, but they should join institutions that focus on different kinds of governance activities, as set out above. While existing research in environmental politics suggests that extensive participation signals strong cooperative policy preferences (Bernauer et al. 2010), when seen through the lens of deepeners and

fragmenters, the cooperative intent behind extensive participation is more ambivalent. The mere fact of institutional proliferation is not enough to understand outcomes in world politics. Measuring participation in climate institutions requires sensitivity to these two opposing motivations for joining. To account for this, I develop new scores for participation in climate governance using a statistical measurement model that allows me to situate states as deepeners or fragmenters. Specifically, I use Bayesian item response theory (IRT) to estimate state ideal points from their climate memberships, similarly to applications in the human rights regime (Lupu 2013; Fariss 2018). In contrast to measuring participation by simply counting memberships, the IRT model allows for dimensions of participation and for membership to be positively and negatively correlated across institutions. If deepeners and fragmenters join different climate institutions, as my theoretical argument expects, then the IRT model will capture these memberships patterns across climate institutions.

I use these new measures of participation to study the relationship between participation in international institutions and substantive international cooperation. I leverage a unique design feature of the 2015 Paris Agreement on Climate Change to measure each state's willingness to contribute to collective mitigation. Many institutional designs set common policy targets for all members, which leads targets to converge to the demands of the least ambitious actors and hinders measuring each actor's cooperative behavior (Downs et al. 1998). However, the Paris Agreement skirts this in a way foreseen by Gilligan (2004) because it allows states to set their own policy targets. Using data from climate scientists (Robiou du Pont et al. 2017), I develop a new measure of the ambition of states' greenhouse gas mitigation targets. I show in statistical tests that, consistent with my theoretical expectations, deepeners have more ambitious mitigation targets than fragmenters. By contrast, raw participation is not associated with the ambition of states' Paris targets. The perspective I advance in this paper allows an egress from debates about whether international cooperation in general is shallow or deep by highlighting that under certain institutional designs we can measure the depth of individual states' contributions to collective action.

For scholars of climate politics, this paper builds on Keohane and Victor (2011)'s work on the regime complex for climate change to explain participation across climate institutions and its link to cooperative climate policy. This paper also addresses the literature on climate clubs, by examining the role of existing minilateral climate institutions, which share some aspects of these idealized clubs, but differ in others (Stewart et al. 2013; Nordhaus 2015; Falkner 2016; Green 2017;

Hovi et al. 2019). It also highlights the role of distributive conflict in structuring climate politics (Genovese 2019; Aklin and Mildenberger 2020; Colgan et al. 2020), in contrast to the literature's persistent focus on free riding (Barrett 2003). For scholars of overlapping institutions, I outline a new concept-pair rooted in states' patterns of institutional memberships that helps explain how states use dense institutional environments. Finally, for scholars of international cooperation, I show how institutional design can convey information about states' willingness to contribute to collective action.

In the next section, I develop my theory of two-sided dissatisfaction in response to existing debates about the effect of institutional proliferation on international cooperation. I develop this theory using climate governance, and in the subsequent section, I describe the intense institutional proliferation in climate politics and how these institutions differ from the design of the prominent UN climate treaties. Next, I develop new scores for state participation in climate institutions using ideal point estimation. I also construct a new measure of states' cooperative climate behavior using states' targets in the Paris Agreement. Finally, I use statistical tests to assess my theoretical argument that different forms of dissatisfaction condition participation and cooperation. I conclude by suggesting how researchers can use instances where universal membership institutions intersect with a broader set of institutions to study institutional proliferation in other issue-areas, and also suggest avenues for future research on climate institutions outside of my sample, measuring states' climate policy preferences, and climate policy beyond mitigation.

2 Institutional proliferation in global politics

Many studies have noted a proliferation of international institutions in recent decades, leading issue-areas such as development finance, human rights, and climate change to be much more institutionally dense than previously. Classical theories of institutionalized cooperation do not expect states to create overlapping institutions to govern the same issue. Institutions that overlap in membership and scope duplicate existing functions, increase the complexity of institutionalized cooperation, and are, therefore, inefficient (Van de Graaf 2013). The transaction costs of cooperating—which international institutions are supposed to lower—are raised in situations where actors must transact across many overlapping institutions compared to situations with a single, focal institution (Drezner 2013).

While institutionalist theory has been broadly optimistic that individual international institutions facilitate cooperation among states, theorists of overlapping institutions are more pessimistic. From the perspective of traditional institutionalist theory, overlapping institutions increase the number of possible coordination points within an issue-area and degrade previously constructed focal points that structured cooperation (Drezner 2013). States that are members of overlapping institutions may be compelled to follow one set of rules as a member of one institution and another, conflicting set of rules as a member of another. Some studies go a step further and argue that states may intentionally use overlapping institutions to create conflicting coordination points in order to obstruct cooperation (Benvenisti and Downs 2007; Drezner 2013). Powerful states may use new institutions to support alternative principles and rules in attempts to shape the evolution of cooperation toward their preferred cooperative outcomes (Morse and Keohane 2014; Lipscy 2017). When multiple institutions within an issue-area set obligations for members, states may opportunistically only comply with the most favorable rules for their circumstances (Raustiala and Victor 2004). These studies raise concerns that states may use overlapping institutions to shirk their obligations and that institutional proliferation weakens international cooperation. An implication of this perspective is that states that participate extensively across institutions are states that seek to undermine cooperation.

By contrast, other studies have argued that a greater number of institutions within an issue-area may facilitate cooperation. When states are members of more institutions, there are more opportunities for interaction, communication, and learning about counterparts' preferences (Alter and Meunier 2009; Davis 2009). Furthermore, states may create outside institutions to strengthen cooperation on particular topics that are difficult to advance in existing forums (Kelley 2009; Johnson and Urpelainen 2012). By separating topics from a larger problem into new tailored institutions, subsets of states may be able to support deeper cooperation than was previously possible (Downs et al. 1998). Smaller forums with narrow scope may be better suited to forging consensus and supporting cooperation than larger forums with more diverse membership and that span more topics. Dense institutional environments, accordingly, may develop a core of states that accelerate cooperation at a quicker pace than would be sustainable among all states. Contrary to the fragmentation perspective, this separation perspective sees states that participate extensively across institutions as states that seek to support cooperation.

These diverging perspectives also structure the climate literature. As Bulkeley et al. (2014, 65) note, the effect of institutional proliferation in climate governance may be either to undermine multilateralism at the UNFCCC or to advance implementation and promote cooperative behavior. Critics worry "that shifting the focus to nonmultilateral fora will allow countries to shirk their responsibilities" to reduce their greenhouse gas (GHG) emissions (Hale et al. 2013, 268). Advocates, by contrast, note that the UNFCCC-led process has been prone to gridlock and that new climate forums may create incentives for climate action (Victor 2011; Stewart et al. 2013). As I argue below, these two outcomes are not strict alternatives. To understand how institutional proliferation relates to cooperative outcomes requires understanding the motivations of proliferating states.

Theories of institutional proliferation stress that states create overlapping institutions when they are dissatisfied with cooperative outcomes in existing institutions (Benvenisti and Downs 2007; Jupille et al. 2013; Van de Graaf 2013; Morse and Keohane 2014; Urpelainen and van de Graaf 2015; Lipscy 2017; Kellerman 2019). Cooperation yields joint gains for participants, though the benefits of cooperation are not necessarily shared equally. When actors are dissatisfied with the distribution of benefits, they may seek to reform an institution, but internal decision-making rules, such as consensus, may preclude this. As a result, states often create outside institutions to reshape cooperation on a topic. The decision-making rules, scope, and membership of these countervailing institutions yield cooperative outcomes that better align with dissatisfied states' preferences. Proliferators seek more favorable cooperative outcomes and use new institutional forums to pull cooperation toward their preferences. Recent work refers to this phenomenon as "contested multilateralism," where the emphasis is placed on how states use other international institutions to contest governance outcomes instead of withdrawing or pursuing unilateral action (Morse and Keohane 2014).

Dissatisfaction with existing cooperation is a powerful explanation for institutional proliferation, however, the concept of dissatisfaction and its implications for state behavior remain underdeveloped. Theorizing the nature of dissatisfaction helps illuminate debates about whether institutional proliferation has positive or negative consequences for international cooperation. Essentially, I argue the key to resolving these debates lies in understanding why states pursue institutional proliferation. Climate politics highlights that states have divergent preferences over the pace and depth of cooperative adjustments in mitigating greenhouse gas emissions. This preference heterogeneity

and distributive conflict leads states to pursue different strategies within institutional proliferation.

When multilateral institutions establish common obligations for members, some states may prefer to coordinate at more or less substantive levels of cooperative adjustments (Downs et al. 1998; Gilligan 2004). In climate politics, some states would prefer to move on GHG mitigation at a quicker pace than the UNFCCC currently adopts, whereas other states fear the compliance costs of quicker GHG mitigation. This creates two opposing types of dissatisfaction, as some states would rather pursue collective mitigation at a quicker pace, while others would rather do less than. Each type of dissatisfied state may draw on countervailing climate institutions to shift the trajectory of multilateral climate cooperation in their favor. Ambitious states establish and join climate institutions to accelerate multilateral GHG mitigation objectives, while laggards join rival climate institutions to fragment and obstruct cooperative progress on mitigation. Accordingly, states may participate extensively to support or to undermine cooperation in climate change.

The tension between actors that prefer more aggressive climate action and those that seek to delay it reflects underlying distributive conflicts in climate politics that are increasingly of interest to political scientists (Genovese 2019; Aklin and Mildenberger 2020; Colgan et al. 2020; Kennard 2020). This distributive conflict also shapes participation in climate institutions, where states may be dissatisfied with the pace of cooperative progress within climate negotiations, but from opposite perspectives and thus pursue opposite institutional proliferation strategies. First, states may be dissatisfied with cooperative progress that proceeds too slowly. Until 2015, there was hardly any progress on the elaboration of mitigation obligations at the UNFCCC (Victor 2011; Hale et al. 2013). In response, ambitious states increasingly shifted climate governance activities outside the UNFCCC and into new, purpose-built climate institutions. These forums are problem-oriented and focus on building national capacities to implement climate policy. States established new institutions to pool resources in navigating emergent carbon markets (e.g., Prototype Carbon Fund), fund mitigation activities in developing countries (e.g., Forest Carbon Partnership Facility), and pursue low-cost, high leverage technological solutions (e.g., Global Gas Flaring Reduction Partnership). These institutions were created over the past two decades to build national and international capacity to support climate action. Institutional proliferation can be a strategy of separating concrete topics within climate governance into stand-alone forums with narrower membership that allow motivated actors to pursue cooperative gains unencumbered by climate laggards (Downs et al. 1998; Johnson

and Urpelainen 2012). States established these new non-UNFCCC institutions to guide the evolution of climate multilateralism toward greater ambition. I call these states *deepeners*, in reference to their efforts to deepen the substantive ambition of international climate politics.

However, these new capacity-building institutions are only one side of the proliferation story. States that are unwilling to enact deeply substantive GHG mitigation policies see any signs of progress on mitigation as threatening. For states that fear the costs of any new mitigation obligations, creating new forums is a strategic move to counter any forward momentum in climate governance. They create an alternative set of negotiating forums that increase the costs of transacting in climate politics (e.g., Major Economies Forum). Their forums challenge the centrality of the UNFCCC as the main negotiating forum and act as staging grounds for rival rules and principles to those enshrined in the UN climate treaties. These forums challenge the UNFCCC's use of legally binding rules, quantified GHG emissions targets, and differentiation in the responsibilities of developed and developing countries (e.g., Asia-Pacific Partnership on Clean Development and Climate) (Karlsson-Vinkhuyzen and van Asselt 2009). Negotiators must then convene almost all year round in overlapping institutions that duplicate existing functions of the UNFCCC, thereby degrading the capacity to articulate a collective response. I refer to these states that are dissatisfied with cooperative progress that proceeds too quickly and that use countervailing institutions to disrupt climate governance as *fragmenters*. Fragmenters may participate across forums to cultivate an appearance of engagement with climate governance and alleviate pressures from domestic, transnational and international actors. Fragmenters use institutional proliferation to shape the trajectory of climate multilateralism to match their preferences for slower and less mitigation.

Deepeners and fragmenters, therefore, have very different perspectives on climate governance, yet some of their observable behaviors may be similar, as both types of states may pursue institutional proliferation. As such, extensive participation across climate institutions may indicate little about a state's underlying preferences for cooperation. This implication contrasts with existing arguments that extensive participation either reflects underlying cooperative or non-cooperative preferences. When seen through the lens of deepeners and fragmenters, extensive participation has a more ambiguous relationship to substantive cooperation.

While deepeners and fragmenters may both participate extensively across climate institutions, I expect they will join different institutions from each other because not all institutions are alike

and not all institutions will help them achieve their goals. Deepeners join forums focused on building the capacity to support ambitious climate policies. These forums are more applied and address tangible topics, such as the design of domestic carbon pricing instruments. By contrast, fragmenters are not interested in pursuing ambitious climate action. Their institutional memberships skew toward networking forums, where actors can look busy but without taking meaningful steps toward decarbonization. As a result, deepeners and fragmenters will have different patterns of institutional memberships. There should be no single effect of institutional proliferation on cooperative outcomes, since this will depend on the motivations of states for participating across a dense institutional landscape. I expect, therefore, that deepeners will adopt more cooperative policy positions than fragmenters. Applied to climate change specifically, I expect deepeners will engage in more ambitious climate action, such as by committing to more stringent greenhouse gas mitigation targets. The concept-pair of deepeners and fragmenters helps to reconcile opposing perspectives on overlapping institutions by refocusing the debate in terms of state behavior rather than cooperative outcomes at the level of an issue-area.

As I elaborate below, measuring participation using the sum of a state's climate memberships will conflate the opposing motivations deepeners and fragmenters have for joining climate institutions. To address this, I develop scores for participation based on states' patterns of institutional memberships that better recover their preferences for deepening versus fragmenting climate governance. Two main empirical implications follow. First, the *sum* of a state's institutional memberships within an issue-area should not be associated with their cooperativeness. Second, instead, states' *patterns* of institutional memberships should predict cooperativeness, since deepeners and fragmenters join different kinds of institutions.

My theory argues that climate memberships reflect the balance of pro-climate governance and anti-climate governance forces within a country. Of course, many factors determine state participation across international institutions, such as policy preferences (Downs et al. 1998; Lupu 2013), domestic political institutions (Van de Graaf 2013), development levels (Kellerman 2019), and the interests of bureaucrats, firms, and environmental groups (Andonova et al. 2017). One consideration might then be that memberships are driven primarily by these other, more diffuse, factors than by considerations specific to climate change. Another consideration might be that memberships are shaped idiosyncratically by many different sub-topics within climate politics, such

as forestry or agriculture, rather than a broader assessment of the pace of climate cooperation. Both of these alternative perspectives would provide explanations for membership in climate institutions, but they do not have the same implications for states' cooperative climate behavior as my argument. If these alternative explanations better explain membership, then a state's climate memberships should actually be unrelated to their substantive climate policies because the disparate inputs that drive membership should not have systematic effects on climate policy across states. If the drivers of membership are so diverse, then there should not be a signal between membership and subsequent cooperation. I argue, by contrast, that we should observe a strong relationship between participation in climate institutions and states' cooperative behavior because these two behaviors are motivated by the same set of state preferences over the pace of climate action.

Ultimately, climate governance presents us with a relatively complex set of institutions and calls for a general explanation for participation. Foregrounding state preferences over the pace of climate cooperation provides a clear, general, and parsimonious explanation for a large amount of participation. This is not to deny that other factors influence participation decisions, but participation in the aggregate—across over sixty climate institutions—is more likely to reflect systematic pro- and anti-climate action preferences than more contingent factors. Although I have described the concept-pair as two ideal types, states can certainly hold intermediate preferences over the pace of climate cooperation between these two ends of a spectrum. For example, a climate institution may have a core membership of deepeners who are very active in climate governance, as well as a larger set of members with more intermediate climate preferences who see specific benefits from membership in that institution.

3 Institutionalized cooperation in climate change

Empirical studies of climate politics have tended to focus on the UN-led process and the annual Conferences of the Parties (COPs) (Depledge 2006; von Stein 2008; Castro et al. 2014). However, there is a much broader range of institutionalized climate cooperation than is captured by focusing narrowly on this set of institutions. For example, studies have drawn attention to transnational climate governance, where non-state actors network across borders outside the remit of the UNFCCC (Hale and Roger 2014; Bulkeley et al. 2014). Furthermore, given that climate intersects with many other issue-areas, such as trade, health, and other pollutants, rule-making in other issue-areas may impact

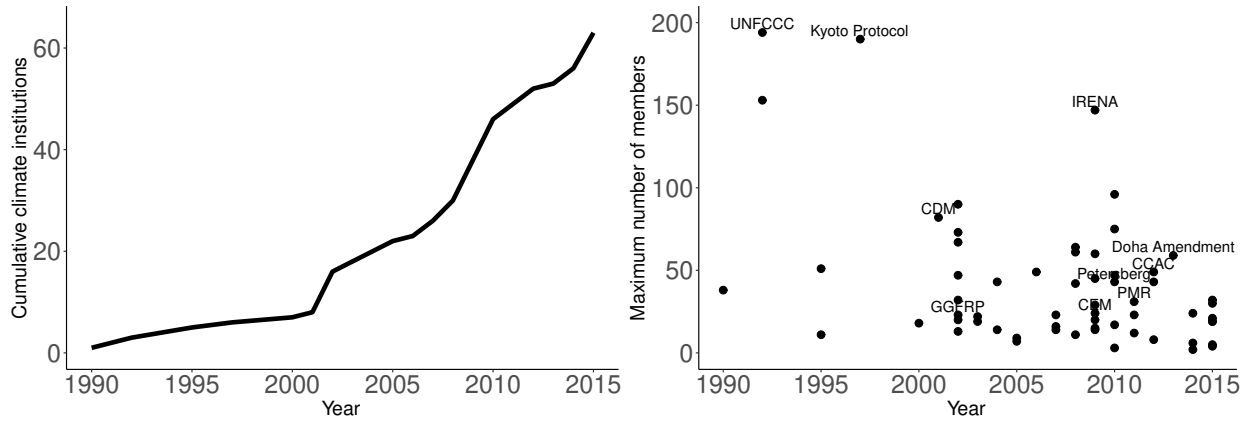

Figure 1: Institutional proliferation in international climate politics

rule-making within climate change (Keohane and Victor 2011). This research program has yielded many new insights into climate politics, but in building this fuller picture, research has overlooked climate change's tremendous *within issue-area* institutional density. Since the early 1990s, over 60 different climate-specific institutions have been created that include states as members, without counting those in other issue-areas that could impact on climate change, such as trade rules under the World Trade Organization. In this paper, I study these intra-climate institutions, which allows me to hone in on states' climate-specific behavior as distinct from their behavior in global governance more generally.

The earliest climate institutions are mostly broad membership international treaties, such as the United Nations Framework Convention on Climate Change and the Kyoto Protocol. However, instead of simply adding new protocols that sequentially tightened parties' mitigation commitments, as has been the case in ozone governance (Bodansky et al. 2017), states created a vast array of institutions to address different aspects of climate governance. Figure 1 plots the growth of climate governance institutions over time. After a decade of modest institutional creation, there is an inflection point in 2002, coinciding with the Bush Administration's repudiation of the Kyoto Protocol and the World Summit on Sustainable Development in Johannesburg, when states began sustained institutional proliferation. States have created new climate institutions consistently since the early 2000s, and show no indication of slowing down.

These new climate institutions differ from the UNFCCC in a number of ways, suggesting that studies of the UN-led process may not generalize across international climate politics. First, UN

climate negotiations represent the peak of multilateralism, where representatives from roughly 200 states attend, but the majority of climate institutions have fewer than 50 members. In the right panel of figure 1, I plot the number of state members in each climate institution to demonstrate that later institutions have much smaller membership than the UN-led process.

Secondly, the UN climate treaties differentiate rigidly between developed and developing countries—Annex 1 and non-Annex 1 countries, respectively (Castro et al. 2014)—but other climate institutions tend to integrate countries. Third, many climate governance institutions are public-private partnerships that network states with firms and civil society actors to address climate change, in contrast to the state-centric UN-led process (Bulkeley et al. 2014). Fourth, non-UNFCCC initiatives do not create legally binding obligations for members, preferring instead to use softer means to steer targets toward policy goals, such as providing support for implementation or developing best practices (Hale and Roger 2014). By choosing to govern through non-binding agreements, many of these institutions resemble the "low-cost institutions" conceptualized by Abbott and Faude (2020). Fifth, many outside climate institutions specialize in particular topics, such as carbon pricing, GHG emissions from agriculture, or short-lived climate pollutants, in contrast to the COP negotiations' broad scope. This provides opportunities for subsets of states to accelerate cooperation on priority topics without needing to engage all the UNFCCC parties. From the perspective of this broader landscape of climate governance, the institutional designs of the UNFCCC and Kyoto Protocol stand out as anomalous, while the Paris Agreement blends some elements from both styles of institutions.

I create a new dataset that tracks state membership in climate institutions over time using publicly available documents from institutions' websites. My dataset tracks the population of climate governance institutions that have state members, be they formal intergovernmental organizations with only state members, transnational schemes where states govern alongside non-state actors, or variants in between. This contributes to broader research on polycentric climate governance (Jordan et al. 2015), but focuses on the subset of governance activities that include states as members. My inclusion criteria are designed to complement those adopted in transnational climate governance, which are discussed extensively in Bulkeley et al. (2014) and Hale and Roger (2014). The key difference is that I focus on state participation in climate governance, whereas the transnational governance literature focuses on non-state actors. To be included in my study, a climate institution

must (1) have states as members, (2) must explicitly pursue governance objectives in relation to climate change, (3) meet regularly outside UNFCCC negotiations, and (4) membership must stem from a decision to join that institution. I elaborate on these inclusion criteria in the supplementary information.

4 Empirical investigation

4.1 Scaling participation in climate institutions

I use this new dataset to measure states' dissatisfaction with the pace of climate cooperation through their institutional memberships. Dissatisfied deepeners and dissatisfied fragmenters may both join a similar *number* of climate institutions, but they should join different institutions from each other, and therefore have dissimilar membership *patterns*. Summing climate memberships will be uninformative since this conflates opposing motivations for joining. Accordingly, I conceptualize membership decisions as driven by two dimensions of state preferences: a state's general propensity to participate in global governance, and their pro- or anti-climate governance preferences. In practice, decisions to join any individual climate institution may be motivated by a number of factors, such as domestic political battles and interest groups. However, a more general theory is required to understand participation in the aggregate—for 190 states and 63 institutions. I argue that foregrounding states' preferences over the pace of cooperation provides a general, tractable, and parsimonious explanation for variation in participation. I measure these state preferences using ideal point estimation, as I explain below.

To measure participation, I develop new ideal points of states' climate preferences using Bayesian item response theory (IRT). IRT improves upon many of the shortcomings of the more naive additive index, or count measures. IRT allows membership to be correlated across institutions. The additive index assumes that membership across institutions is perfectly uncorrelated, but if deepeners and fragmenters systematically join and do not join certain institutions, then memberships will be correlated. IRT allows for positive correlations between institutions, implying that members of one institution are more likely to be members of another, and for negative correlations that imply members of one institution are less likely to be members of another. IRT also allows for institutions to be weighted differently, whereas the additive index assumes all memberships are equal, namely that they contribute 1 to a state's total.

Crucially, IRT allows for membership to be driven by underlying dimensions and I use this to estimate a two-dimensional model of participation. A two-dimensional model allows me to separate states' pro-climate action preferences from their more general international preferences. It is well-known that some states, particularly wealthy ones, participate much more extensively in global governance (Bernauer et al. 2010), and I do not want this underlying propensity to participate to drive climate membership scores. Accordingly, I estimate a first dimension that captures this underlying pro-global governance preference and a second dimension that captures states' pro-climate action preferences (i.e., deepeners and fragmenters). I validate the interpretation of these dimensions below.

Researchers often use ideal point estimation techniques, such as IRT, to recover actors' unobserved preferences in a policy space from their observed policy decisions (Clinton et al. 2004; Genovese 2014). IRT estimates a set of state- and institution-level parameters to fit observed membership choices in a manner similar to statistical techniques for estimating other binary outcomes. The key difference is that, instead of observing the outcome and explanatory variables then estimating unknown coefficients to fit the data, in IRT, only the institutional memberships are observed, so the remaining parameters are estimated using a re-sampling technique. The model inputs are a matrix of country-level institutional memberships, and the model outputs are a set of country- and institution-level parameters that maximize the joint posterior probability of the estimated parameters. The IRT model fits a binary indicator of whether a given country $i \in 1, 2, ..., I$ is a member of a given climate institution $j \in 1, 2, ..., J$. Let $y_{i,j} = 1$ if a state i is a member of institution j, and $y_{i,j} = 0$ if that state is not a member.[2] I use a cross-sectional measure of membership taken in 2015, the year that countries submitted their Paris climate targets. This measure removes information about the timing of membership decisions since 1990 and does not include membership in the Paris Agreement.

IRT estimates the probability that a state i is a member of a climate institution j by estimating latent country-level and institution-level parameters to fit the observed membership data. The country-level parameters are ideal points (x_i), and the two institution-level parameters are difficulty parameters (α_j) and discrimination parameters (β_j). Multiple dimensions $d \in 1, 2, ..., D$ can be

[2]Data are coded as missing if a state is not eligible for membership, such as the ratification of additional protocols for countries that have not ratified the primary framework convention.

estimated, and in higher dimensions ideal points ($x_{i,d}$) and discrimination parameters ($\beta_{j,d}$) are estimated in each dimension. The probability that state i joins institution j is given by a function linking state ideal points to that institution's difficulty and discrimination parameters mapped on to the unit probability interval in two dimensions:

$$Pr(y_{i,j} = 1|x_{i,d}) = \Phi(\alpha_j + \beta_{j,d=1} \times x_{i,d=1} + \beta_{j,d=2} \times x_{i,d=2}) \quad (1)$$

The IRT model resembles a probit regression model, with the discrimination parameters being institution-specific regression coefficients ($\beta_{j,d}$), the difficulty parameter being an institution-specific intercept (α_j), and the ideal points being vectors of country-level data ($x_{i,d}$). States' ideal points represent their scores for participation in climate institutions. When a pair of states share common institutional memberships, their ideal points are estimated to be similar, and when a pair of states join different institutions their ideal points are estimated to be dissimilar. I plot states' ideal points and institutions' discrimination parameters in the supplementary information.

IRT models are not identified without constraints. Following Jackman (2001), I supply a set a restrictions on the discrimination parameters of three institutions in a two-dimensional model to identify the model output. These constraints operate as weak informative priors that influence the rotation of the model, but the values chosen are not large enough to determine the final outputs. Accordingly, the estimated parameters for the other 60 institutions and for all states can move flexibly around three constrained discrimination parameters to fit ideal points that correctly classify state membership.

I choose constraints theoretically, using the implications of my argument about diverse institutional types, to separate institutions in the recovered climate space. I want to separate states based on their climate preferences, while accounting for the fact that some states participate much more extensively in global governance generally. I set two capacity-building institutions—the Partnership for Market Readiness (PMR) and the International Partnership for Mitigation and Monitoring, Reporting and Verification (IPMMRV)—to separate states on the basis of their pro-climate action preferences. Members of these institutions are assumed to be deepeners. These two capacity-building forums assist states in developing domestic carbon pricing systems (PMR) and making their climate policies and pledges more transparent and accountable (IPMMRV). To account for general global governance behavior, I set prior discrimination parameters for the Clean Energy

Ministerial (CEM), a climate institution composed of the states that participate most extensively in climate governance, to separate states only on the basis of this global governance trait. I constrain the PMR to have prior discrimination parameters in two dimensions equal to $\beta_d = (1, 1)$; the IPMMRV's discrimination parameters to $\beta_d = (0, 1)$; and the CEM's discrimination parameters to $\beta_d = (1, 0)$.[3] The PMR's members are among the most active states in climate governance and states that are relatively serious about climate action, but they tend to be middle- and high-income countries. To avoid prejudicing the participation of lower-income countries who participate less in global governance but may nonetheless support faster climate action, I constrain the IPMMRV to allow developing countries to be deepeners even if they do not join many climate institutions. In this sense, ambitious developing countries that are not obvious candidates for the PMR are strong candidate members of the IPMMRV.

Arranged this way, the second dimension is the key measure of states' climate preferences, with deepeners scoring high values and fragmenters low values. The first dimension captures a more mechanical propensity to join international institutions, identifying joiners at high values. Both dimensions are important for predicting climate memberships. On the whole, the two-dimensional model correctly predicts 86.9% of memberships, while the pro-climate action dimension alone predicts 83.4% of memberships and the global governance dimension alone predicts 83.2% of memberships. The model outputs represent statements about climate institutions and states. They express whether deepeners or fragmenters are more likely to be members, and whether an institution has broad membership or only states that already participate extensively in global governance. The absolute values of the discrimination parameters in each dimension indicate whether one dimension is more decisive than another in predicting membership. The sign of the discrimination parameters reflects whether states at high or low values of that dimension are expected to be members. More positive values of the second dimension discrimination parameter indicate institutions composed of deepeners.

Latent variable models must be validated to ensure that the scores actually measure their intended concepts. I now consider the match between an institution's characteristics and their estimated parameters to show how the pro-climate action dimension is structured by capacity-building institutions. In a later section, I validate the ideal points further by showing how they predict

[3] I show outputs for alternative constraints in the supplementary information.

countries' mitigation targets. In the supplementary information, I provide additional validation exercises, namely comparing my climate ideal points to states' broader international preferences as measured by UN General Assembly voting (Bailey et al. 2017) and with regression models.

To see IRT in practice, consider membership in the Global Research Alliance on Agricultural Greenhouse Gases (GRA, 46 members). The GRA was established in 2010 to support research and capacity-building to reduce GHG emissions from agriculture, a sector that accounts for over 11% of global annual GHG emissions. The left panel of figure 2 plots countries' ideal points, actual membership in the GRA, and the dashed cutting line that separates predicted members from non-members. Ideal points are normally distributed around 0 with a standard deviation of 1 in both dimensions. The cutting line represents the set of ideal points where a country would be indifferent between joining and not joining an institution. The relatively flat cutting line indicates that the second dimension is a stronger determinant of membership than the first, and that deepeners and more likely to join than fragmenters. The model predicts GRA membership well (86.4%). Most states are not expected to join the GRA, but the states that are expected to join are deepeners (high 2D) and states that participate extensively (high 1D). Actual members are indicated by a plus sign (+) and non-members are indicated with an open circle (∘). Blue markers are correctly classified membership decisions, whereas red markers are incorrect predictions.

In the right panel of figure 2, I plot the predicted membership of the Carbon Sequestration Leadership Forum (CSLF, 24 members). In contrast to the GRA's focus on mitigating climate change, the CSLF advocates for capturing CO_2 emissions at power plants, but has made very limited progress piloting this technology. Note that the ideal points are exactly the same in both plots since they are country-level outputs and do not vary by institution, though the position and angle of the cutting line and the model predictions change. The very steep cutting line indicates that the CSLF's membership is expected to include states that participate extensively but that deepeners and fragmenters are equally likely to be members. Overall, the model correctly classifies 93.7% of CSLF memberships.

The second dimension discrimination parameters ($\beta_{j,d=2}$) describe the extent to which the pro-climate action dimension structures membership in any climate institution. 33 of the 66 second dimension discrimination parameters are statistically significant, indicating that this dimension is

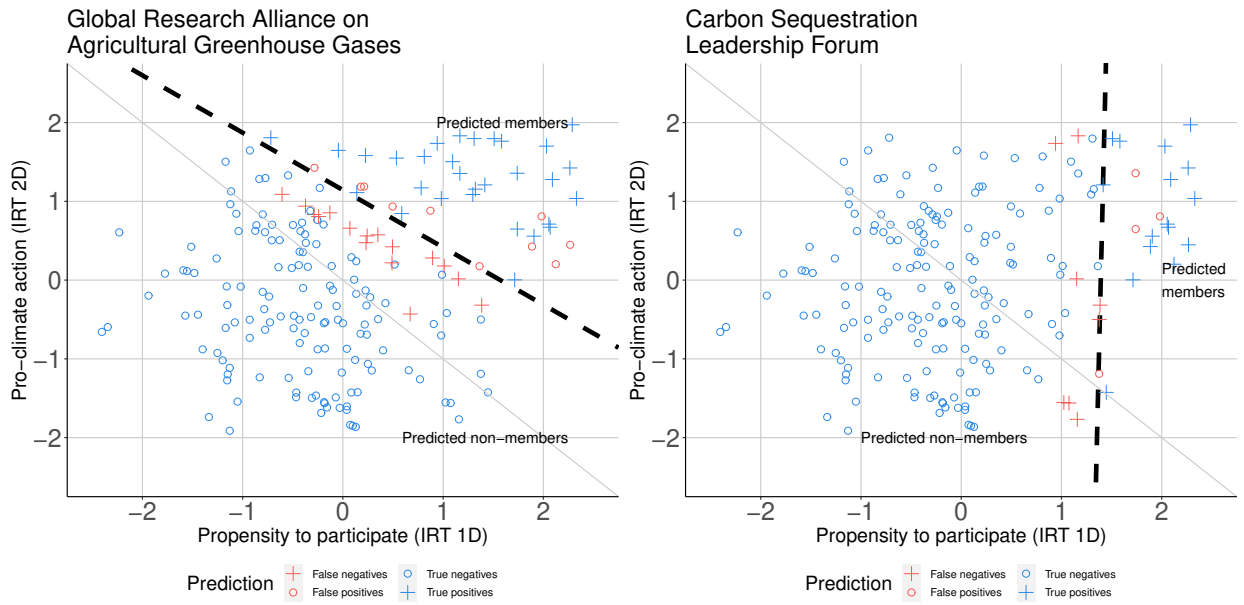

Figure 2: IRT predictions for two institutions. Coordinate points represent the ideal points of individual states. Black dashed lines separate predicted members and non-members of a particular institution. Actual members are denoted with plus signs and non-members with an open circle; correct model predictions are in blue and incorrect predictions in red. A reference $y = -x$ line is plotted in the background.

well estimated.[4] Many of the most prominent implementation forums have positive and statistically significant second dimension discrimination parameters, which means that their members are deepeners. Consider the Climate and Clean Air Coalition, which has a positive second dimension discrimination parameter and helps members identify mitigation policies for a range of short-lived climate pollutants that are often overlooked in comparison to carbon dioxide and which provide local air quality co-benefits. The GRA, described above, also has a positive second dimension discrimination parameter. Climate finance institutions, such as the Prototype Carbon Fund, also have high values of the second dimension discrimination parameter, which again supports identifying the second dimension as related to implementation and capacity-building. This matches my theoretical expectation that ambitious states move ahead with concrete climate sub-topics in new standalone forums given the slow progress on mitigation at the UNFCCC. Deepeners want faster progress separate substantive topics into new alternative institutions and the second dimension ideal points capture this behavior. We will see in the next section that these memberships also predict the

[4]Climate institutions that have separate donors and recipients are split in the IRT estimation into one side for "donors" and another for "recipients". This leads the number of discrimination parameters to exceed the total number of institutions. Further information on these institutions is included in the supplementary information.

stringency of countries' GHG targets.

By contrast, negotiating forums do little if anything to structure second dimension ideal points. Consider the Petersberg Climate Dialogue, whose members' second dimension discrimination parameter overlaps with zero, meaning that they do not help locate states along the dimension. The International Renewable Energy Agency also does not attract deepeners, which matches criticisms that it has been ineffective at supporting climate action. This implies that the membership of ambitious institutions that facilitate implementation diverges from the membership of institutions that fragment negotiating and networking across the climate regime. States are situated along the second dimension based on the intensity of their relative participation across implementation forums. This yields a continuous measure of states' participation in an important subset of climate governance forums: those that deepen climate cooperation by facilitating implementation among like-minded peers at a quicker pace than would be possible than at the UNFCCC. The ideal points provide summaries of states' international climate preferences.

4.2 Scaling cooperation using Paris pledges

Mitigating climate change requires all states to reduce their GHG emissions in the long-term. States often act through international institutions to coordinate these kinds of costly policy reforms. Generally, institutions facilitate cooperation by outlining clear obligations for members and these obligations are often the same for all members, which can lead to lowest common denominator bargaining (Downs et al. 1998). Climate cooperation under the Paris Agreement follows an alternative design, wherein states selected their own policy targets in documents called, Intended Nationally Determined Contributions (INDCs). Since some states selected stringent GHG mitigation targets and others adopted weak ones, I leverage this to measure states' cooperative behavior in international climate politics. States' policy targets also differed in the 1997 Kyoto Protocol, but the Kyoto targets were negotiated at the Kyoto climate conference, whereas the Paris targets were selected domestically before the Paris conference and their levels were not re-negotiated.

This design feature notwithstanding, it is difficult to measure the cooperativeness of states' climate policies because states are setting out from very different starting points (Aldy et al. 2017). Countries have different capacities to respond in the present and have made different contributions to the problem historically. Simply comparing percentage reductions from the present day will

not reflect mitigation effort or ambition. The measurement challenge is to find an appropriate benchmark against which to measure mitigation targets.

Accordingly, I build on data from climate scientists to benchmark each country's actual GHG mitigation target against hypothetical mitigation targets they could have chosen that would be consistent with 2 °C of warming (Robiou du Pont et al. 2017). This measurement uses the natural relationship between atmospheric concentrations of GHGs and global mean temperature to create a global GHG budget consistent with 2 °C of warming. This fixed stock of emissions is then divided up among all countries proportional to country-level characteristics that proxy for different normative positions on equitable mitigation that structure climate negotiations, as summarized by the Intergovernmental Panel on Climate Change (IPCC 2015, 458). Concretely, this entails assigning emissions quotas using combinations of states' GDP and GHG emissions per capita. Robiou du Pont et al. (2017) derive emissions quotas for each state, and I re-scale this data to measure the continuous percentage difference between these quotas and a country's actual GHG target in the Paris Agreement. As I explain below, this creates a measure of each state's willingness to contribute to equitable collective mitigation.

Robiou du Pont et al. (2017) use combinations of country-level characteristics to create five GHG emissions quotas for each state, each consistent with a different position on equitable mitigation (see table 1). The capabilities standard (CAP) requires countries with high GDP per capita to undertake stronger mitigation reductions. The equal cumulative per capita emissions standard (CPC) requires countries with high historical per capita emissions to accept stronger mitigation objectives. The equality standard (EPC) requires countries' GHG emissions per capita to converge from their present values to common low levels. The greenhouse development rights standard (GDR) allocates emissions using both GDP per capita and historical GHG per capita emissions, but also affirms that climate mitigation should not place development burdens on developing countries. Therefore, it only considers emissions and income within a country above a development threshold. Finally, the constant emissions ratio standard (CER) requires all countries to reduce their emissions at the same constant rate of 5% from 2010 levels. If all countries set their GHG mitigation targets equal to the same emissions standard (e.g., EPC), then we would expect less than 2 °C of warming.

I adapt these quotas as benchmarks for measuring the depth of cooperation. I take the percentage difference between each state's Paris GHG target and the median of their five equity quotas as an

	GHG emissions per capita	
GDP per capita	No	Yes
No	CER	EPC (present GHG) CPC (historical GHG)
Yes	CAP	GDR (historical GHG)

Table 1: Inputs to the Robiou du Pont et al. (2017) equity quotas

indicator of cooperative mitigation. The new measure has a meaningful zero, indicating parity between a country's target and that quota. Ambition is scaled positively, so positive values indicate targets that propose greater emissions cuts than an assigned quota, and negative values indicate lesser cuts than assigned. Ambitious countries have positive scores.

Most quotas allow developing country emissions to grow in the near future, before plateauing and declining around mid-century. Developed countries' quotas generally call for immediate stringent emissions reductions, given their high GHG emissions per capita and high GDP per capita. In figure 3, I plot the GHG emissions levels of France and Morocco, as well as their Paris targets and their assigned 2030 quotas. The plots give an indication of the trajectory of national emissions, as well as the scale of necessary emissions reductions. Both countries' targets are consistent with some standards, but fall short of meeting others. France, as a wealthier country with greater historical and contemporary per capita GHG emissions, has a more stringent allocation of GHG emissions than Morocco. By this metric, Morocco has a more ambitious target than France since Morocco has pledged to keep its emissions below its median equity quota while France's target exceeds its median quota. Many countries have worse targets than the median of their equity quotas and the most outlying countries have very weak, rather than very strong, targets. I provide more information on measuring the ambition of climate policy targets in the supplementary information.

4.3 Estimation

The emissions quota data yields an indicator of the ambition of countries' Paris GHG targets. However, the INDCs that countries submitted as their Paris pledges vary in form and are difficult to compare. The primary reason for non-comparability between INDCs is that individual submissions may lack specific information that would make their GHG targets quantifiable (Rowan 2019). For example, some countries communicated GHG targets as percentage cuts from a business as usual (BAU) forecast, but did not actually specify what that business as usual reference level. Of the 195

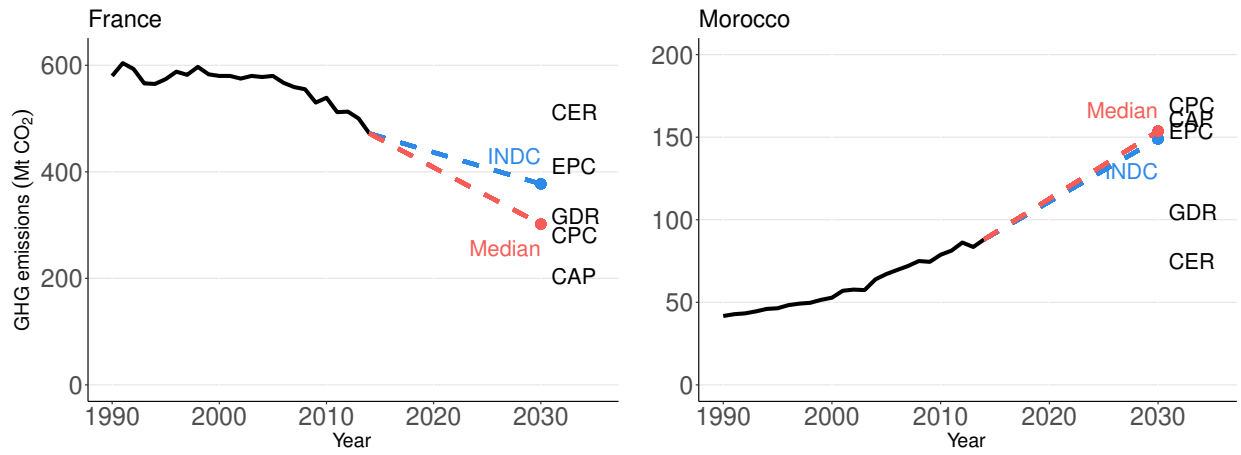

Figure 3: GHG emissions trajectories and equity quotas for France and Morocco's. INDC targets are depicted with blue and their five quotas are denoted with labels

Parties to the UNFCCC, only 112 have quantifiable GHG targets in their INDCs.[5] This ultimately creates the potential for nonrandom sample selection, where the subset of countries that submitted quantifiable target may differ systematically from the subset of countries lacking quantifiable targets.

Accordingly, I treat the INDCs as two nested dependent variables. States both decide whether or not to have a quantifiable GHG target and select a continuous level of GHG mitigation. I use the Heckman estimator to estimate these two steps jointly, accounting for any bias that may arise from sample composition as we do not observe every state's level of ambition. The Heckman estimator requires an exclusion restriction, where one variable enters the selection equation but not the outcome equation. This variable must predict the quantifiability of states' targets, but not their level of ambition. I use a binary indicator for whether a country had a GHG target in the 2010 Cancun Agreements, which never became legally binding, as this excluded variable. The primary concern with this indicator is that more ambitious countries set both targets in the Cancun Agreements and then quantifiable and ambitious targets in the Paris Agreement, which would violate the exclusion restriction.

This concern is unfounded for three reasons. First, countries with Cancun targets in fact have less ambitious targets in the Paris Agreement on average than countries without Cancun targets. Second, all Annex 1 countries had Cancun targets and quantifiable Paris targets because they carried over the same base year target templates from the Kyoto process. Their Paris targets are quantifiable,

[5]Detailed information on targets is available from the World Resources Institute.

but are not more ambitious by virtue of having adopted climate targets earlier in the UN negotiations. A number of developing countries proposed targets for the first time in Cancun, but nearly all of these Cancun targets lack reference GHG emissions levels that allow for quantification. Having submitted mostly vague targets after Cancun, many developing countries adopted quantifiable targets in Paris, though these targets are not necessarily more ambitious than countries without Cancun targets. Cancun countries are more likely to have quantifiable Paris targets, but not necessarily more ambitious ones because the Paris target-setting process was unstructured. Finally, countries retained effective levers for masking low levels of ambition, such as by manipulating reference emissions levels to make a headline percentage reduction seem larger. Existing research shows that countries used the vagueness of the Paris process to obfuscate without resorting to submitting non-quantifiable targets (Keohane and Oppenheimer 2016; Rowan 2019).

I predict mitigation ambition as a function of three measures of participation k in climate governance: (1) a state's count of climate memberships, (2) their share of climate memberships, and (3) their two-dimensional IRT ideal point estimates. The sum and share measures represent naive measures of the extensiveness of a state's engagement with climate governance. Considering a state's percentage share of climate memberships accounts for uneven membership eligibility, such as how states can only join the Clean Development Mechanism if they ratify the Kyoto Protocol. If all institutions are alike, then each should count equally, and this is what the sum and share indicators capture. If instead, institutions are of different types and different kinds of states systematically join different kinds of climate institutions, then the sum and share measures will poorly reflect participation decisions. In this case, the ideal point measures will provide good summaries of state participation. I estimate variants of the following econometric model:

$$\Pr(\text{Observable}_i = 1 | \text{Participation}_i^k, z_i) = \Phi(\text{Participation}_i^k \beta_s + z_i \delta + \nu_i) \tag{2}$$

$$\text{E}(\text{Ambition}_i | \text{Participation}_i^k, \text{Observable}_i = 1) = \text{Participation}_i^k \beta_o + \lambda_i \rho + \mu_i \tag{3}$$

where i indexes states, $k \in \{\text{sum, share, IRT}\}$ indexes the measures of participation in climate institutions, and z_i is a vector of country-level data that predicts quantifiablity of targets. Subscripts on the coefficients allow them to differ in the selection stage (β_s) and the outcome stage (β_o). ρ estimates the correlation between the error terms of both equations (ν_i, μ_i), providing a statistical measure of sample selection bias. I add country-level covariates to both stages in subsequent

models.

The analysis is a single cross-section, with the ambition of national mitigation pledges being observed in 2015. Participation in climate institutions is also measured in 2015. Control variables are measured in 2007 before most climate institutions had been established, to guard against membership affecting covariates. I use multiple imputation to address missing covariate data. Summary statistics for all variables are available in the supplementary information.

5 Regression analysis

I argue that participation in climate institutions is driven by states' preferences over the pace of cooperation, with deepeners seeking to accelerate cooperation and fragmenters seeking to disrupt cooperation. Based on my theoretical argument, I expect that deepeners have more ambitious mitigation targets than fragmenters, and so expect a positive coefficient on the pro-climate action score. By contrast, I do not expect to find an association when measuring participation using a state's sum or share of climate memberships, since I have argued that these measures conflate states' opposing motivations for participation. A consistent relationship between the deepeners–fragmenters score and the ambition of states' Paris mitigation targets would further validate my interpretation that this dimension captures states' pro- and anti-climate cooperation preferences.

In table 2, I estimate the relationship between participation and targets with a minimal specification. Neither the sum of climate memberships (model I) nor the share of climate memberships (model II) are statistically significant predictors of either quantifiable GHG targets (selection stage) or the ambition of Paris GHG targets (outcome stage). These models support my first expectation, that straight counts of membership will not be associated with the stringency of countries' targets.

In model III, I predict mitigation ambition using the two-dimensional ideal point estimates. I now find a strong positive coefficient for the pro-climate action scores: deepeners have more ambitious targets than fragmenters. The negative coefficient on the joiners variable indicates that countries' underlying propensity to participate in global governance is associated with selecting less ambitious targets. Model III shows the ideal points provide good summaries of states' climate preferences, as they predict the ambition of their Paris targets. Crucially, this is true when states' sum and share of climate memberships—more direct measures of engagement, but measures that poorly reflect the nature of participation decisions—do not predict target stringency.

	I		II		III	
	Observable	Ambition	Observable	Ambition	Observable	Ambition
Sum of climate memberships	0.029	0.581				
	(0.017)	(0.415)				
Share of climate memberships			0.017	0.317		
			(0.010)	(0.257)		
1D: Joiners					0.139	-25.759
					(0.146)	(5.592)
2D: Fragmenters → deepeners					0.260	21.553
					(0.110)	(4.938)
Cancun GHG target	1.345		1.347		1.288	
	(0.242)		(0.241)		(0.299)	
ρ		0.473		0.471		0.114
		(0.112)		(0.111)		(0.185)
Intercept	-0.644	-40.452	-0.652	-40.033	-0.262	-15.134
	(0.209)	(10.539)	(0.216)	(10.781)	(0.131)	(7.712)

Table 2: Heckman sample selection models estimating the relationship between participation in climate institutions and states' Paris GHG targets. Outcome variable is the percentage difference between a country's INDC target and the median of their five equity quotas. Robust standard errors in parentheses. Models contain 172 observations, of which 94 are observed and 78 are censored.

Nonetheless, the relationship between participation and cooperation is clearly confounded by other variables. In table 3, I add covariates and re-estimate the relationship between participation and cooperation in climate governance. The covariates capture attributes of states that may influence the ambition of their climate policies, as well as their likelihood to participate in climate institutions. These variables also capture elements of the political and economic benefits and costs of mitigation. For example, mitigation may be more costly for states that depend heavily on fossil fuel rents, and less costly for states that are more vulnerable to climate impacts. I also control for states' ratification of other international environmental agreements to partial out their underlying propensity to participate in global environmental governance.

Models IV and V again show the raw count and share of climate memberships are not statistically significant predictors of mitigation ambition. The extent to which states participate in climate institutions is unrelated to the ambition of their mitigation pledges, after controlling for observable variables that may influence both states' underlying propensities to participate in climate institutions and the ambition of their pledges. In model VI, deepeners remain more likely to adopt ambitious mitigation pledges than fragmenters, though the magnitude of the coefficient shrinks by roughly half.

	IV		V		VI	
	Observable	Ambition	Observable	Ambition	Observable	Ambition
Sum of climate memberships	0.026	0.710				
	(0.021)	(0.602)				
Share of climate memberships			0.015	0.373		
			(0.012)	(0.357)		
1D: Joiners					-0.028	-11.436
					(0.194)	(7.150)
2D: Fragmenters → deepeners					0.271	11.246
					(0.140)	(4.930)
IEA ratifications	0.024	0.478	0.024	0.509	0.024	0.508
	(0.009)	(0.218)	(0.009)	(0.210)	(0.009)	(0.209)
Vulnerability to climate impacts	-0.016	1.550	-0.016	1.531	-0.025	0.913
	(0.025)	(1.569)	(0.025)	(1.568)	(0.026)	(1.436)
Renewable electricity generation	-0.001	0.352	-0.001	0.356	-0.002	0.317
	(0.003)	(0.170)	(0.003)	(0.170)	(0.004)	(0.171)
Domestic environmental performance	-0.012	-1.570	-0.012	-1.589	-0.013	-1.480
	(0.015)	(0.900)	(0.015)	(0.898)	(0.015)	(0.842)
Domestic environmental NGOs	-0.022	-0.689	-0.023	-0.690	-0.023	-0.343
	(0.027)	(1.131)	(0.028)	(1.154)	(0.028)	(1.141)
Democratic political institutions	-0.060	-1.661	-0.060	-1.694	-0.064	-1.374
	(0.052)	(2.484)	(0.052)	(2.488)	(0.055)	(2.543)
Fossil fuel rents	-0.172	-13.570	-0.173	-13.595	-0.172	-12.227
	(0.114)	(6.192)	(0.115)	(6.265)	(0.115)	(5.788)
Cancun GHG target	0.896		0.894		0.988	
	(0.334)		(0.334)		(0.358)	
ρ		0.042		0.047		-0.086
		(0.161)		(0.159)		(0.189)
Intercept	0.528	0.425	0.531	1.471	1.325	30.186
	(2.027)	(123.054)	(2.028)	(123.271)	(2.068)	(112.100)

Table 3: Heckman sample selection models estimating the relationship between participation in climate institutions and states' Paris GHG targets. Outcome variable is the percentage difference between a country's INDC target and the median of their five equity quotas. Covariates are measured in 2007 and missing data is accounted for using multiple imputation. Robust standard errors in parentheses. Models contain 172 observations, of which 94 are observed and 78 are censored.

States' patterns of climate memberships are important predictors of the ambition of their climate policies. This is especially novel given that more direct measures such as the sum and the share of their climate memberships are unrelated to their targets. The deepeners–fragmenters dimension results support my theoretical argument about states' motivations for participating across overlapping institutions and supports the identification of the IRT model parameters, with the second dimension capturing states' support for deeper climate cooperation. Figure 4 demonstrates the substantive importance of the pro-climate action variable, where a one standard deviation change in a country's fragmenter–deepener score is associated with a 0.34 [0.17, 0.52] standard deviation

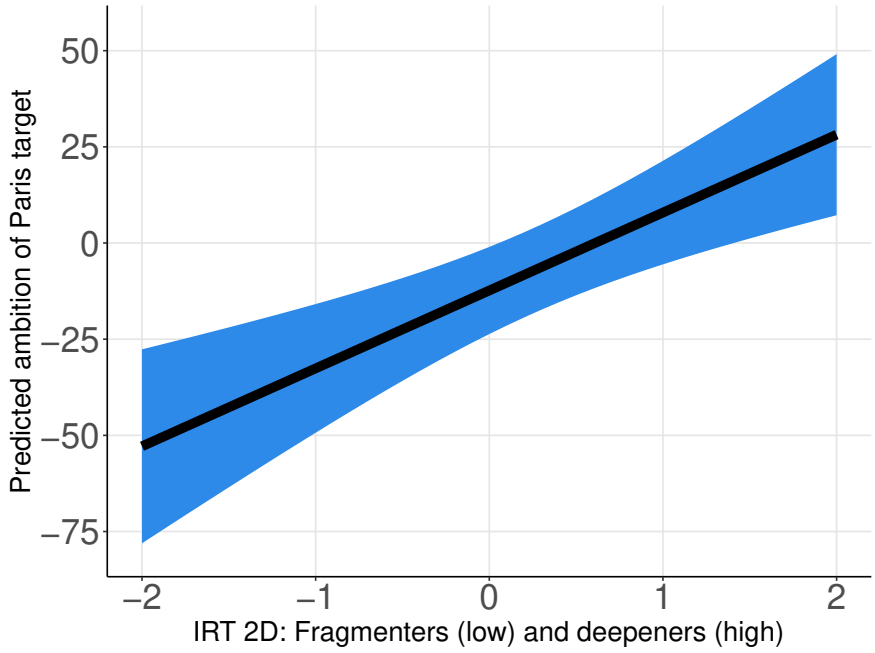

Figure 4: Marginal effect of pro-climate action variable on ambition of Paris targets from model XIX. One standard deviation change in IRT 2D (0 → 1) associated with a +0.34 standard deviation change in ambition.

change in predicted ambition.

Note, however, the lack of statistical evidence of non-random sample selection in models III–VI, as indicated by the ρ term. ρ is the estimated correlation coefficient between the error term in the selection equation (equation 2) and the error term in the outcome equation (equation 3). The coefficient switches signs across models and is relatively imprecisely estimated. Since I find little statistical evidence of sample selection, I conduct a robustness check (model XIX) below using the ordinary least squares estimator on the sample of countries with fully observable targets and find the same relationship as in model VI.

Figure 5 summarizes the results of a series of robustness checks of these main results. I add additional controls variables (GHG emissions, GDP per capita, GDP per capita squared; models VIII–X), use different sample selection criteria by excluding certain kinds of GHG targets from the analysis (models XI–XII), and use alternative measures of ambition from the five components of the mitigation ambition measure (models XIII–XVIII).[6] Since state ideal points are estimates and contain uncertainty, I also estimate the relationship using the ideal points from each iteration of ideal point estimation procedure (model XX). I build a 95% confidence interval around the median

[6]The GDR measure is top-coded at the 5th and 95th percentiles due to large outliers.

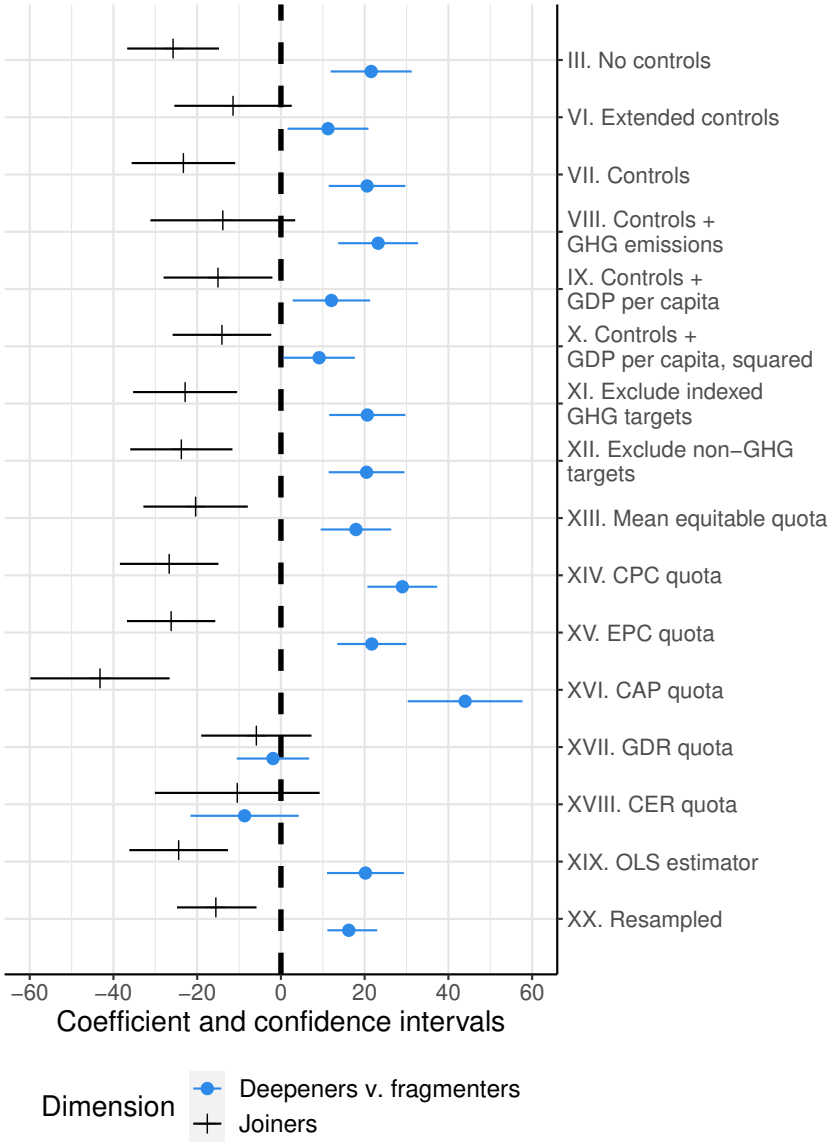

Figure 5: Robustness of outcome stage ideal point coefficients. Regression coefficients and 95% confidence intervals for different model specifications. "Controls" specification retains only the variables that are statistically significant in model VI ("Extended controls").

estimate and find a similar substantive and statistically significant relationship. The ideal points are very consistent predictors of states' mitigation ambition in the Paris Agreement on Climate Change.

6 Conclusion

Institutional proliferation is widespread in global politics. Nonetheless, scholars have struggled both to develop a general theory of participation in these contexts and to assess whether institutional proliferation enables effective cooperation. I show that these two topics are linked. I build on

existing theories of dissatisfaction-led institutional proliferation to argue that dissatisfaction with existing cooperative outcomes conditions participation. However, climate politics highlights that dissatisfaction is multifaceted, as states may prefer that cooperation on GHG mitigation proceeds quicker or slower. These two types of dissatisfaction over the pace of cooperation leads each type of dissatisfied state to join different kinds of institutions in efforts to advance their interests. As a result, states separate themselves by type through their repeated membership decisions. I measure this separation using ideal point estimation to create scores for participation. This measure improves upon commonly-used counts of institutional membership, which conflate opposing motivations for membership. I use my new participation scores to show that states that join institutions that build the capacity to implement climate policy adopt more ambitious targets than states that join negotiating forums. Restated, deepeners have more ambitious targets than fragmenters. At the same time, the extent of state participation across institutions is unrelated to mitigation targets, belying arguments that institutional proliferation supports or undermines cooperation in general. Instead, the types of institutions that states join matter.

This finding follows from a distinctive convergence in climate politics. While states have created many climate institutions, they have also kept the pre-existing universal membership forum—the annual UN climate negotiations. Concurrently, a special design feature of the Paris Agreement allows for a relatively crisp measurement of each state's willingness to contribute to collective action, since states selected their own mitigation targets. As such, we observe both variation in states' participation across institutions as well as their behavior in the common UN setting. Future research on institutional proliferation should look for instances when diffuse governance architectures intersect with large membership forums to observe how states that participate differently across institutions behave in that common forum. The primary task for future research on institutional proliferation is comparing across issue-areas. My analysis supports the literature's broader focus on dissatisfaction with cooperation in existing institutions as a main driver of proliferation.

Three methodological choices in this study suggest avenues for future research. I examined state participation in institutions deliberately created to manage climate change since these are a coherent set of institutions where membership is plausibly driven more by climate policy positions than general dispositions toward internationalism. However, these institutions are not the only international institutions where climate change is addressed. Future research could analyze how

membership in non-climate institutions that touch on climate change (such as the G-20 rules on domestic fossil fuel subsidies) affects climate policy. Nonetheless, the drivers of participation in these climate-adjacent institutions may be different from the drivers of membership in climate-specific institutions.

I estimated states' climate ideal points from their membership across climate institutions. However, ideal points can also be estimated from national speeches or documents (Genovese 2014), though unlike publicly available climate membership data, these documents may not be available for all states and time periods. Future work could examine the relationship between ideal points from institutional memberships and other climate behaviors. Ideal point estimation summarizing national preferences faces conventional critiques of conceptualizing the state as a unitary actor. It is beyond the scope of this paper to examine the origins of national climate preferences in detail. Nonetheless, an open economy politics perspective could highlight domestic sectoral interests, public opinion, and political institutions as inputs (Genovese 2019). A more structural perspective could draw attention to uneven vulnerability to climate impacts. Both of these perspectives could be consistent with new research on the distributional consequences of climate change and climate policies (Aklin and Mildenberger 2020; Colgan et al. 2020).

I examined the link between states' climate ideal points and their GHG mitigation targets. This raises important subsequent questions about the implementation of mitigation policy and compliance with mitigation targets. These topics are necessarily speculative, since states mostly set policy targets for 2030, though preliminary research could begin on these topics. Furthermore, GHG mitigation is only one aspect of climate governance, even if it is perhaps the most important. Future work could extend the analysis here to examine adaptation, climate finance, and geoengineering policies, as states' priorities may differ across these topics.

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