

Special Section: Domestic Climate Policy under Anarchy

Prisoners of the Wrong Dilemma: Why Distributive Conflict, Not Collective Action, Characterizes the Politics of Climate Change

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Abstract

Climate change policy is generally modeled as a global collective action problem structured by free-riding concerns. Drawing on quantitative data, archival work, and elite interviews, we review empirical support for this model and find that the evidence for its claims is weak relative to the theory's pervasive influence. We find, first, that the strongest collective action claims appear empirically unsubstantiated in many important climate politics cases. Second, collective action claims—whether in their strongest or in more nuanced versions—appear observationally equivalent to alternative theories focused on distributive conflict within countries. We argue that extant patterns of climate policy making can be explained without invoking free-riding. Governments implement climate policies regardless of what other countries do, and they do so whether a climate treaty dealing with free-riding has been in place or not. Without an empirically grounded model for global climate policy making, institutional and political responses to climate change may ineffectively target the wrong policy-making dilemma. We urge scholars to redouble their efforts to analyze the empirical linkages between domestic and international factors shaping climate policy making in an effort to empirically ground theories of global climate politics. Such analysis is, in turn, the topic of this issue's special section.

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Scholars have largely converged on collective action theory to explain the global failure to mitigate climate risks (inter alia Bernauer 2013; Keohane and Victor 2016; Ostrom 2009; Stern 2007). According to this received wisdom, every country wants a stable climate but also faces individual incentives to free-ride off other countries' climate mitigation efforts. This pushes all countries to unsustainably exploit the global atmospheric commons. In turn, policy guidance from collective action proponents emphasizes the need for international institutions to overcome the climate policy free-riding problem. The global climate policy architecture, as embodied by the Kyoto Protocol, reflects a belief that free-riding constituted the main constraint on effective climate action (Victor 2011).

Despite being the dominant paradigm of climate policy, the collective action account has mostly been accepted without extensive empirical tests. In this article, we outline a framework to evaluate collective action theory's capacity to explain patterns of global climate policy making. Strong collective action claims suggest that climate policies are *primarily* structured by free-riding concerns. Drawing on quantitative and original qualitative data, we cannot find evidence to empirically substantiate this perspective in many important climate politics cases. A weaker version of collective action theory would argue that concerns over free-riding structure (but do not dominate) climate policy making and that other factors can also contribute to it. We find some empirical evidence consistent with this perspective; however, this evidence can also be explained by competing theories without the need to invoke free-riding. In sum, we find that collective action accounts of climate change are either unsubstantiated or vulnerable to observational equivalence and that this empirical support is weak relative to the theory's pervasive influence.

What are the sources of this mismatch between theory and empirical evidence? We suggest that many scholars have tended to conflate climate *outcomes* and climate *policies*. Climate outcomes are undoubtedly characterized by negative externalities. Policy, however, responds to a different logic. What governments often care about is maintaining the support of key constituencies. In the case of climate change, governments' preferences are shaped by conflicts between pro- and anti-climate reform interests. Climate policy involves a dramatic renegotiation of the institutions that structure economic and social activity within each economy. Consequently, climate policies create new economic winners and losers. Sharp divisions in the material interests of political and economic stakeholders trigger subsequent distributive conflict over climate policy making. Conflicts over material benefits are further reinforced by ideological struggles among politicians, voters, and interest groups. Empirically, this distributive conflict lens offers an alternative explanation for empirical patterns currently attributed to collective action theory, while also accommodating empirical evidence that is otherwise anomalous to collective action accounts. By contrast, we cannot identify any empirical facts that are uniquely explained by either the strong or weak version of collective action theory. To be clear, free-riding concerns may, at times, be a source of climate action failure. What this article argues is that we need a richer theoretical model that does not narrowly focus on a single cause.

Instead, we need to place free-riding concerns alongside many other potential breaking points.

The absence of a robust empirical foundation for collective action accounts of climate politics has serious implications for international relations. Decades of international negotiations have sought to address free-riding because there was widespread belief that this was holding back climate policy. Treaties such as the Kyoto Protocol and the Paris Agreement sought to create transparent and verifiable commitments, presumably in order to increase compliance. Our findings join critical voices arguing that this was the wrong solution to a misunderstood problem (e.g., Victor 2011). Yet our review raises deeper questions about institutional design for global climate regimes. Solutions such as climate clubs, while offering several benefits, may still not solve the climate problem if the logic of climate politics has been misdiagnosed. To the extent that distributive conflicts are the main constraint on effective policies, international agreements may be more successful if they instead focus on empowering key pro-climate interest groups and neutralizing veto players, such as fossil fuel interests.

Without an empirically substantiated understanding of climate politics' problem structure, social scientists cannot offer a necessary contribution to climate policy making (Mitchell 2006). In this spirit, this special section brings together a series of research articles that contribute to this effort, offering nuanced analyses of how linkages between domestic and international factors shape climate policy making.

The Collective Action Conventional Wisdom

Over the past decades, many social scientists have come to view environmental problems as, first and foremost, commons management issues (Stavins 2011). This perspective interprets clean air, clean water, and stable ecosystems as common pool resources with nonexcludable but rival benefits. Since individuals cannot be excluded from enjoying these goods, each has an incentive to overexploit the commons. Solving the problem requires community production of public goods.

Collective action characterizations of commons management issues highlight two distinct logics. First, players must expect an outcome under the "business-as-usual" that is suboptimal compared to some other possible outcome. What makes competing outcomes "better" is not always specified. Second, players face individual disincentives to move from the suboptimal to the optimal outcome. Investing in public goods production is individually costly, but the benefits of action are contingent on the number and scale of group contributions. Furthermore, no actor can unilaterally produce the public good alone. Thus, every player has an incentive to free-ride and let others shoulder the costs of public goods provision. But the public good will not be provided if every player behaves this way.

In game-theoretic terminology, this suboptimal status quo is thus a Nash equilibrium. This logic is often portrayed with reference to the classic Prisoner's Dilemma game, where two players are jointly better off when both cooperate than

when both defect. However, each player is best off when she defects while the other continues to cooperate. Global politics, then, is about finding a solution to the free-riding problem (Keohane 1984; Kindleberger 1973).

Noting that climate change is almost by definition a public bad (Bernauer 2013), scholars have widely applied collective action theory to interpret patterns of climate policy outcomes.¹ While there are significant collective benefits associated with climate change mitigation, climate policy imposes concentrated costs on early movers who, nevertheless, only capture a small fraction of their actions' global benefits. Generally making the simplifying assumption that the key actors are governments or political leaders, every country has an incentive to free-ride off others' mitigation efforts. In the absence of strong global institutions to facilitate climate cooperation, major economies will continue to exploit unsustainably the global atmospheric commons (Sandler 2004; Stern 2007).

This understanding of climate change is pervasive. A Google Scholar joint search for the terms "climate change" and "free-riding" generates some 18,200 unique hits.² Likewise, a search of the terms "climate change" and "Prisoner's Dilemma" generates 3,120 results. Characteristic of this viewpoint, Weitzman (2017, 559) argues that "the core problem confronting the political economy of climate change is an inability to coordinate global social outcomes to overcome the obstacles associated with free-riding." Barrett (2003, 2) blames the shortcomings of the Kyoto Protocol on its failure to "provide the supporting mechanisms needed to restructure the relations among the world's countries, to reverse the incentives to free-ride." Nordhaus (2015, 1339) argues that "the fundamental reason [for climate policy inaction] is the strong incentives for free-riding in current international climate agreements." Carattini et al. (2017, 3) contend that "free-riding is still viewed as the norm in the climate commons." These statements provide sharp theoretical claims about the structure of global climate politics. While subject specialists sometimes offer more nuanced claims (see later discussion), uncritical assertions that free-riding dominates climate policy making remain ubiquitous.

Collective Action Theory's Testable Hypotheses

Our starting point to represent collective action's testable hypotheses is the repeated Prisoner's Dilemma. Effective climate risk mitigation involves repeated interactions and policy measures over decades. In repeated Prisoner's Dilemma games, cooperative agreements can be maintained as long as players value the future enough. Repeated interactions can also generate trust, another facilitator of cooperative outcomes (Ostrom 1990). For example, scholars have examined how time affects the prospects of cooperative agreements (e.g., Heitzig et al. 2011; Nordhaus and Yang 1996).

1. The notion that climate change is a public bad is quite uncontroversial, although some regions—especially wealthy ones—could benefit in the short run from climate change (Mendelsohn et al. 2006).
2. As of October 15, 2019.

From this setup, we can summarize the core predictions of collective action models in the climate domain. First, like the one-shot Prisoner's Dilemma, the fundamental collective action problem in a repeated game framework remains the danger of free-riding and defection—and this is true in models of climate policy as well. As Barrett and Stavins (2003, note 22) note, “the need for punishments to sustain cooperation is one of the most basic insights to have emerged from the literature on repeated games.” In this way, climate policy making is fundamentally reciprocal: political actors will implement policy reforms if and only if others do so as well. Unilateral cooperation is irrational considering economic costs and benefits because it implies that an actor is willing to suffer the costs associated with others' free-riding.

Second, assuming that a Pareto-superior agreement has been agreed upon (more on this later), political actors will renege on their climate policy commitments if other political actors reduce or back out of their climate policy actions. This is particularly likely when defection is done by a *pivotal* player. By “pivotal,” we mean a player whose participation is important for providing the global public good.³ A country such as the United States circa 1997–2001 is a good example of a pivotal player: it emitted about 23 percent of global CO₂ emissions during that period.⁴ In a collective action framework, US defection ought to cripple climate policy in other countries because it would become technically unlikely that the problem could be solved without the pivotal player's participation.

Third, collective action accounts of climate change solutions emphasize that international agreements must be designed to tackle free-riding concerns. For an agreement to be successful, at the bare minimum, it needs to do two things: it has to solve the monitoring problem, and it must clarify punishment for cheating (or rewards for respecting the agreement). States must know whether others comply with their obligations, and if they don't, then a mechanism must exist *ex post* to induce cheaters to meet them. Setting up such an agreement is not an easy task because collective action problems are not only the source of the problem but also impede the likelihood of implementing such a treaty (Keohane 1984).

We can restate these considerations as empirical predictions. We label propositions that must be true for collective action concerns to dominate global climate politics as the strong collective action (SCA) prediction set.

1. Prediction SCA1: collective action requires institutions to fend off free-riding—these include frameworks to effectively monitor cooperation and punish noncooperation.
 2. Prediction SCA2: countries pass climate policies reciprocally.
 3. Prediction SCA3: defection by pivotal players is reciprocated.
3. Only the grimmest of grim trigger strategies would predict a complete breakdown of the climate regime if a minor country defected, hence our focus on larger countries. By focusing on pivotal players, we stack the deck in favor of collective action theory.
 4. CDIAC, http://cdiac.ornl.gov/trends/emis/tre_coun.html, last accessed August 20, 2020.

However, we can also relax these propositions to offer a weaker claim that free-riding matters as one of many factors (not the dominant factor) shaping global climate policy making. We label the testable implications of these claims as the weak collective action (WCA) prediction set.

1. Prediction WCA1. International negotiations on climate policy will include debates about collective action and free-riding.
2. Prediction WCA2. The probability of countries taking costly climate action will be enhanced if other countries do so because of reduced free-riding concerns.
3. Prediction WCA3. The probability of defection will be increased by the defection of pivotal players because of increased free-riding concerns.

One immediately relevant feature of these more circumscribed claims is that, empirically, the weak prediction set only requires a critical subset of national decision makers to be motivated by free-riding concerns; so long as conditional cooperators are the “swing” actors within a given political system, free-riding concerns become a binding constraint on climate policy-making outcomes. This weaker set also allows for countries to calibrate their levels of climate policy-making ambition *within* a climate institution without outright defection. For instance, countries might react to US defection from Kyoto by reducing their climate efforts without reciprocally abandoning the regime. We return later to a more complete consideration of the theoretical and empirical consequences of adopting a weak or strong prediction set for global climate politics analysis. More generally, this weaker collective action set encompasses a diverse range of behavioral responses by countries that reflect concern over free-riding. These can include symbolic action (e.g., treaties that have no real binding effect) so that defection by other parties is largely immaterial.

Beyond these basic conjectures, collective action models have developed a number of extensions that offer more nuanced views of climate policy making. We discuss them to highlight how they maintain free-riding concerns as their core implication. For the sake of space, we leave an extensive discussion of these extensions to the online appendix (section A1) here: https://doi.org/10.1162/glep_a_00578. These include models that allow issue linkages, two-level games, different production technologies of public goods, and asymmetric costs. The latter, for instance, offer a more nuanced view of climate politics. Asymmetric costs give rise to side payments, a phenomenon that we observe in climate negotiations. At the same time, our review shows that these extensions either maintain free-riding as their core concerns or drift far enough that they no longer fit the collective action framework.

The Distributive Politics Meta-theoretical Alternative

Collective action theory does not provide the only theoretical framework to make sense of political conflict over climate policy. A distinct meta-theoretical approach begins by recognizing the fundamentally redistributive nature of climate policy

making. Climate policy involves a dramatic renegotiation of the institutions that structure economic and social activity within each economy. Consequently, climate policies create new economic winners and losers. Sharp divisions in the material interests of political and economic stakeholders subsequently trigger distributive conflict over climate policy making. Conflicts over material benefits are further reinforced by ideological struggles among politicians, voters, and interest groups.

Before detailing the content of the distributive approach, we highlight its roots both in comparative politics and in international relations. We build on climate policy research that emphasizes the importance of domestic actors and the institutions in which they evolve (e.g., Harrison and Sundstrom 2007; Houle et al. 2015; Purdon 2015). At the same time, we do not discount the importance of global politics. Instead, we recast it in different terms than the collective action framework. In the conclusion, we discuss directions from which research in this area comes. Notably, we emphasize the importance of links between macro- and micropolitics (Harrison 2015; see also Hale, Bayer and Genovese, and Harrison, this issue).

An emerging literature on distributive climate conflict highlights two families of explanations. One literature describes climate policy outcomes as a function of special interest control; a second (possibly complementary) literature emphasizes the importance of a sectoral and ideological balance of power. Together, these accounts highlight an alternative meta-theoretical account that can motivate explanations for climate policy action and inaction without invoking the importance of free-riding concerns.

The first family of distributive theories emphasizes special interest control of the policy-making process. For instance, a literature on policy networks emphasizes close ties between carbon-intensive economic sectors and government policy makers (Bailey et al. 2012; Daugbjerg and Svendsen 2001). Mildenberger (2020) characterizes distributive conflict over climate policy as shaped by a logic of “double representation,” where cross-cutting climate policy preferences institutionalize the voice of carbon polluters within both left-leaning and right-leaning political coalitions.

The second family of distributive accounts emphasizes links between climate policy outcomes and the balance of power between policy opponents and proponents (Hughes and Urpelainen 2015; Lachapelle et al. 2017). For instance, some models of climate policy conflict invoke the balance of power between “green” (low-carbon) and “brown” (carbon-intensive) economic actors in a given polity. Aklin and Urpelainen (2013) and Cheon and Urpelainen (2013) link adoption of clean energy policies to the existence of clean energy coalitions that can counterbalance industrial lobbies. Meckling (2011) links the emergence of emissions trade worldwide to “carbon coalitions” between environmental groups and businesses that stand to benefit materially from climate policy. Genovese (2019) shows how firms push for different climate regulations depending on how polluting they are. Coalitions can also include voters who may form preferences because they are affected by climate policies or because they hold ideational (nonmaterial) beliefs. For example, Stokes (2015) explores the electoral costs

of distributive conflict over renewable energy policy expansion. The median voter could therefore incentivize (or not) climate policy implementation (Bättig and Bernauer 2009). Distributive accounts can also highlight how domestic institutions empower certain interests over others (Lachapelle and Paterson 2013; Lipsy 2018; Mildenberger 2020).

Distributional climate policy varies cross-nationally as a function of differences in ideas, interests, and institutions. It explains policy action and inaction as a result of institutionally mediated power imbalances between political coalitions in favor of and opposed to climate reforms. If a distributive conflict (DC) account is empirically valid, its corresponding prediction set includes:

1. Prediction DC1: countries act when pro-climate forces are powerful enough to neutralize politically climate reform opponents (regardless of actions undertaken in other countries).
2. Prediction DC2: defection is not automatically reciprocated because each actor's actions are primarily conditioned by domestic power configurations.
3. Prediction DC3: free-riding is not a binding constraint on patterns of climate policy action—climate policy responses will exist independent of institutions or frameworks to monitor cooperation or punish noncooperation.

Before we turn to the analysis, we wish to note that the distributive conflict lens is not intended to displace the importance of international politics. International factors such as the diffusion of technologies or the spread of information via international organizations can plausibly affect domestic audiences. Moreover, the dynamics of distributional conflict within countries may be distinct from the dynamics of conflict between countries, in terms of the distribution of costs, the distribution of benefits, and the power asymmetries structuring policy bargaining (e.g., Hoffmann 2005; Meckling 2011; Sell 1996; Victor 2011). Instead, our specific query here is whether leaders' fears over collective action failures and free-riding are the predominant constraint on climate policy or not.

More generally, this distributive conflict account is related but distinct from the two-level game literature (Putnam 1988). We believe that domestic conflicts (level 1) carry considerable weight but do not reject the possibility for international politics (level 2) to play a role. Instead, we suggest that the empirical patterns of level 2 politics are not well described by collective action theory. Furthermore, while collective action and distributive conflict accounts are theoretically compatible within two-level game frameworks, the relative importance of one or both is an empirical, not theoretical, research task.

Analysis

We offer a first-order probe of these prediction sets by revisiting a series of critical climate policy-making episodes that have often been cited as evidence for collective climate action. Specifically, we investigate whether climate policy is responsive

to free-riding, the public is a conditional or unconditional cooperator, and elites condition support for climate policies on other countries' action. In each case, drawing a wide set of countries, we show little support for the predictions made by collective action models; in contrast, we find support for distributive conflict accounts.

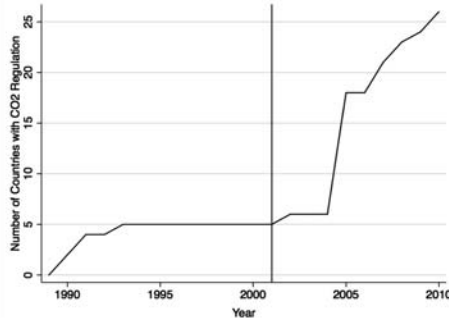
National Policy Action Occurs in the Absence of Institutions to Manage Free-Riding

The international community began negotiating a climate treaty about thirty years ago. Yet, empirical evidence that countries reciprocally adopt or defect from climate commitments remains scant. Instead, a surface reading of global climate politics reveals extensive unilateral climate policy enactment by countries across the world in the absence of a binding global climate treaty.⁵ For example, despite US climate intransigence, the European Union (EU) continued to unilaterally champion climate mitigation policies through the late 1990s and during the first decade of the new millennium. The flagship EU Emissions Trading Scheme (ETS) was negotiated in the immediate aftermath of the US exit from the Kyoto process and was enacted in 2005, at the height of US climate policy intransigence. Despite early setbacks, the ETS has significantly reduced emissions and encouraged technological innovation (Bayer and Aklin 2020; Caelo and Dechezleprêtre 2014). In this sense, the EU continued to “cooperate” with global climate action for years after US “defection.”

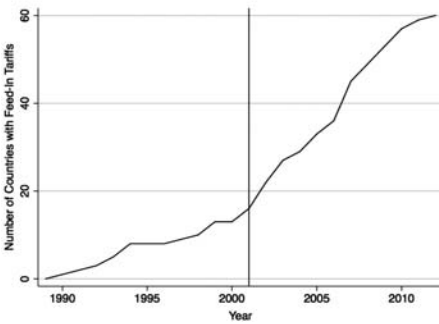
The EU ETS is not unique in this respect. National carbon taxes emerged first in Northern Europe, with Finland, Sweden, Norway, Denmark, and the Netherlands all passing unilateral policies by 1995 (before the Kyoto Protocol had been designed and therefore in the absence of a treaty). Carbon prices would later emerge in Germany (1999), the United Kingdom (2001/2011), New Zealand (2008), Ireland (2010), Australia (2011, later repealed), Japan (2012), France (2013), South Korea (2014), and Mexico (2014). Other regulatory or subsidy-based climate policies were also pursued unilaterally. For example, renewable energy subsidies emerged in Germany (1990/2000) and later in the Czech Republic (2005), Italy (2007), Spain (2008), Switzerland (2008), France (2009), the Netherlands (2009), the United Kingdom (2010), and Japan (2012), among others.

We can visualize these patterns of policy enactment. Of particular interest are reactions to the US exit from the Kyoto Protocol (Milewicz and Snidal 2016). We construct a climate policy adoption timeline before and after 2001, the year in which the Bush administration announced its Kyoto exit. Figure 1 charts the number of countries that have introduced a carbon market, feed-in-tariff support for renewable energy, and renewable portfolio standard (RPS) policies, respectively, between 1990 and 2010. We see that the US exit from Kyoto did not

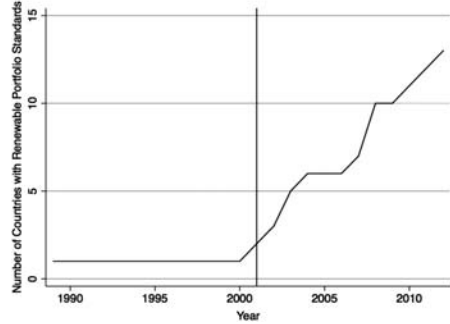
5. Delimiting “climate policy” is sometimes difficult; we focus both on policies that are self-evidently about climate change (like carbon taxes) and on those that are closely linked to it (such as renewable energy policy).



(a) Carbon tax/market



(b) Feed-in tariff (FIT)



(c) Renewable portfolio standard (RPS)

Figure 1

Climate Policy Before and After US Withdrawal from the Kyoto Protocol

The US exit from Kyoto did not change the adoption of unilateral climate policies, which, if anything, *increased* in the decade between US rejection of Kyoto and the failed 2009 effort to negotiate a climate treaty in Copenhagen. The y-axis represents a count of the number of countries that have implemented a given policy. The vertical line indicates the year in which the United States dropped out of the Kyoto regime. Source for carbon taxes and markets is Sommerer and Lim (2016). Source for FIT and RPS is Bayer and Urpelainen (2016).

paralyze climate policy making. If anything, adoption of unilateral climate policies *increased* in the decade between US rejection of Kyoto and again after the failed effort to negotiate a 2009 climate treaty in Copenhagen. Collective action theory would predict conditional defection from existing climate policy commitments during this time period in the face of US free-riding. Apparent persistence of climate policy commitments under the Paris agreement even after President Trump abandoned the pact in June 2017 suggests similar empirical patterns.

In this sense, patterns of national climate policy making are inconsistent with strong predictions of conditional cooperation (SCA2), conditional defection (SCA3), and policy inaction in the absence of effective institutional frameworks to manage free-riding concerns (SCA1). Instead, many countries acted unilaterally in the absence of strong global climate institutions and maintained these actions even as the pivotal carbon polluters defected from weak global institutions. This pattern, by contrast, is fully consistent with predictions DC1, DC2, and DC3.

Of course, the presence of unilateral climate policy making across the world does not provide dispositive empirical evidence against collective action theory. Collective action scholars might argue that countries will still act when unilateral cobenefits associated with action are larger than the potential economic costs associated with unilateral action. In this scenario, we should expect that political actors are still motivated by concerns over free-riding but that these concerns are superseded by the economic or environmental benefits of particular reforms. In other words, collective action scholars might still argue that evidence for the relevance of distributive conflict at the national level does not invalidate the problem structure at the global level.

However, as we now see, there is little evidence that either national publics or political actors routinely behave in ways consistent with collective theory, with respect to both domestic climate policy making *and* their engagement with multilateral climate treaty making. While we do highlight some evidence consistent with the WCA prediction set (but inconsistent with the SCA prediction set), this evidence is observationally equivalent to the distributive conflict account.

National Publics Are Unconditional Cooperators

Despite multiple observational and experimental studies across such diverse places as the United States, Canada, Europe, India, Russia, and China, an emerging climate opinion literature has found scant evidence that national publics are conditional cooperators. In the most detailed review of cross-national opinion surveys, Tingley and Tomz (2013) analyze a range of data from the United States, Europe, and developing countries. They find consistent evidence that large majorities of respondents articulate unconditional support for climate policy action and national participation in global climate treaties. These findings found recent support by Beiser-McGrath and Bernauer (2019), who note that while people have preferences over the design of climate treaties, they are insensitive to information about whether other countries reduced emissions or not.

Figure 2 charts trends in US public support for conditional and unconditional climate cooperation, drawing from time series data collected by the Yale Project on Climate Change Communication. This analysis extends what is reported in Tingley and Tomz (2013). Large majorities (over 60 percent) of the US public are unconditional climate cooperators, and this fraction has remained stable despite a changing global climate regime. We see no evidence that either the Copenhagen failure or the Paris agreement shifted unconditional support levels. Further emphasizing how decoupled many individuals are from the empirical predictions of collective action theory, Tingley and Tomz (2013) show how 5 percent of their sample are climate counterbalancers: individuals whose support for unconditional action *increases*, rather than decreases, in response to global inaction.

Scholars have examined a number of possible reasons for the inconsistency between extant public climate preferences and collective action theory's predictions. Concerned that support for unconditional cooperation may be a function

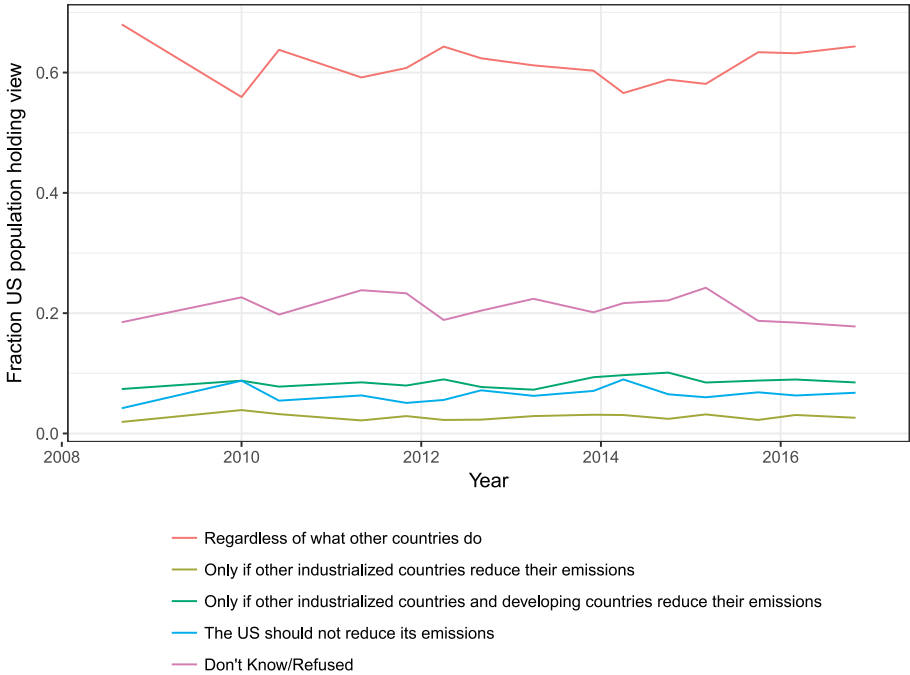


Figure 2
 Fraction of US Population Who Support US Participation in a Multilateral Climate Agreement, by Conditionality of Their Support

Data come from eleven nationally representative surveys of the US public conducted by the Yale Project on Climate Change Communication between September 2008 and November 2016.

of social desirability bias, Bernauer and Gampfer (2015) use survey experiments in the United States and India to probe the robustness of unconditional cooperation. Their results confirm that policies designed to counter free-riding do not shape levels of climate policy support. Bernauer et al. (2016) find similar unconditional support for unilateral action using survey experiments on a Chinese subpopulation.

Some studies do suggest modest increases in policy support when respondents receive information about other country’s actions. Tvinnerheim et al. (2017) test whether multilateral treaty support is conditional on Chinese participation. They find no evidence of conditional cooperation among either Canadian or American publics but find that Chinese participation does increase support among Norwegian and Swedish publics; however, majorities of survey respondents in all countries still unconditionally supported participation. Tingley and Tomz (2013) find increased support for climate agreements in an experimental condition that emphasizes actions by other countries. Bechtel and Scheve (2013) find that climate agreement support increases as global participation goes up and in the presence of sanctions for noncompliance. Li et al. (2004) find that public support and

willingness to pay for a Kyoto Protocol–like agreement increase when developing countries are also subject to binding greenhouse gas limits.

Yet, evidence that treaty support increases with participation does not provide direct evidence that publics are conditional cooperators or primarily motivated by free-riding concerns. Conditional climate actions can be rooted in a wider variety of psychological and social mechanisms, such as a general human tendency to reciprocate or respond to social cues and norms. Furthermore, the broader findings of these studies point to the persistent failure of collective theory to make sense of the empirical distribution of public preferences. Tingley and Tomz (2013) find no evidence of conditional noncooperation, that is willingness to reduce climate policy action in the presence of free-riding by other countries. Instead, they find evidence that the US public appears to link climate cooperation with other issues, what Tingley and Tomz describe as “extrinsic” reciprocity strategies. Yet, such strategies speak more to issues of justice and fairness. Such asymmetrical cooperation cannot be easily explained within a free-riding framework.

Scholars must thus separate evidence for conditional *action* from evidence for conditional *cooperation*. A wide literature on public opinion and psychology literatures emphasizes the diverse ways in which human behavior and preferences are mediated by social contexts, reciprocity, and peer expectations. Our argument is not that countries or publics exist as isolated or independent. There are numerous interdependencies in any policy domain and within any set of political relationships. Instead, our argument is that public preference patterns are inconsistent with claims that free-riding concerns structure public climate preferences.

Of course, an absence of empirical evidence that national publics are conditional climate cooperators does not necessarily trouble the empirical foundations of collective climate action accounts. There are solid theoretical and empirical reasons to doubt the general importance of public beliefs in shaping national policy-making outcomes, for instance, through representation gaps between publics and elites. Yet, a growing literature does emphasize the ways in which public opinion can act as a constraint on elite foreign policy actions (Aldrich et al. 1989; Milner and Tingley 2015). Elites appear to face fewer political disincentives to act on climate change unilaterally than collective action theory might predict (Bernauer and Gampfer 2015). If we take these arguments seriously, then the absence of conditional cooperation among national publics must also matter for efforts to evaluate collective action theory’s empirical relevance.

National Political Actors Behave in a Largely Unconditional Fashion

A wider empirical survey suggests that conditional cooperation among government leaders is just as empirically unsubstantiated. Instead, national political actors largely behave as unconditional cooperators or noncooperators in the climate domain. We first consider two high-profile US climate policy-making episodes that have frequently been cited as empirical examples of “conditional climate cooperation”: the 1997 Byrd–Hagel resolution on Kyoto Protocol nonparticipation

(Tingley and Tomz 2013) and President George W. Bush's stated rationale for withdrawing from the Kyoto Protocol process (Li et al. 2004). We show why efforts to interpret these actions as evidence for conditional cooperation are flawed. Instead, empirical reexamination of these policy-making episodes suggests that they are better viewed as outcomes of distributive conflict.

The US Senate's unanimous Byrd–Hagel resolution, introduced in July 1997, opposed US participation in any international climate agreement that exempted developing countries from carbon pollution limits. The resolution emerged as a response to industrial and labor opposition to the Clinton administration's efforts to negotiate a global climate treaty. Neither Senator Hagel nor Senator Byrd was a conditional climate policy cooperators; instead, both were skeptical of climate reforms generally and represented states with strong carbon-intensive constituencies. Hagel was particularly influenced by various climate skeptics, whose work he entered into congressional debates.⁶

The potential costs of climate reforms to diverse US constituencies allowed Byrd and Hagel to accumulate sixty-five co-sponsors across both parties. Strong climate policy advocates within the Senate, including such Democrats as Senator Kerry and Republicans as Senator Chafee, decided to throw their weight behind the resolution in an attempt to marginalize its significance. Climate reformers believed the resolution text was more ambitious than its authors intended; they hoped to make Byrd–Hagel a symbolic but meaningless vote through their endorsement.⁷ Proponents did not anticipate how Byrd–Hagel would shape the terms of the US climate policy debate over the following decade. Consequently, the Byrd–Hagel resolution cannot be accurately viewed as reflecting the presence of a “swing” constituency whose domestic climate policy preferences were clearly conditioned by foreign polluter treaty participation. Instead, Byrd–Hagel brought together such climate skeptics as Hagel—unconditional noncooperators—with unconditional cooperators who strategically accommodated the power of carbon-intensive interests in an effort to weaken the bill's support. Moreover, many carbon-dependent economic actors who resisted Kyoto and supported Byrd–Hagel now reject the Paris Agreement unconditionally, despite the participation of all global polluters in Paris. Ultimately, conditionality claims read more as a rhetorical device than an accurate characterization of actor motivations.

Contemporaneous debate within the executive branch also engaged Indian and Chinese Kyoto nonparticipation. Yet, in contrast to predictions that free-riding concerns dominated strategic considerations, the State Department, the Energy Department, and the Environmental Protection Agency advocated for a two-step approach where developed countries would try to reach an earlier agreement and then bring developing economies on board at a later point. Instead, the strongest internal voices for conditioning a domestic policy response on foreign actions

6. To the extent that climate skeptics truly doubt climate science, then almost by definition, it does not make sense to imagine them as engaged in a collective action game; in the absence of a shared belief that climate change is a global public bad, the idea of free-riding lacks meaning.
 7. Interview with senior Senate legislative staffer, September 16, 2014.

were senior economists, led by such figures as Larry Summers and Janet Yellen. Most other administration officials pushed Clinton toward aggressive unconditional action, including a commitment to stabilize emissions at 1990 levels by 2015 or 2020. Clinton appears to have immediately favored his environment team's advice, writing "this is better" in the margins of a key memorandum.⁸

Five years later, the Bush presidency underwent similar internal debates in the policy-making process. New legislative momentum had emerged to reduce carbon pollution as part of a broader attempt to improve environmental outcomes. By early March 2001, senators from both parties had found common ground and expected President Bush to support a cap-and-trade scheme (Mildenberger 2020). Yet, in the background, special interests in legislators lobbied President Bush to overturn his stance, noting that pricing greenhouse gas would increase the cost of coal and electricity costs.⁹ By mid-March 2001, President Bush withdrew his support for climate policy. What is critical here is that the decision-making process was almost entirely driven by internal conflicts within the executive branch and the legislature. The individuals pushing for the reversal of US climate commitments were *not* conditional cooperators but *unconditional noncooperators* with ties to carbon-intensive economic sectors; these individuals simply used the rhetoric of collective action theory to help legitimize their domestic bargaining position. We offer additional detail on this episode in Appendix A2, https://doi.org/10.1162/glep_a_00578.

Such examples are not limited to the United States. Similar empirical inconsistencies trouble interpretation of other countries' actions. Both Australia and Canada appeared to have "rationally" pursued noncooperative strategies after US rejection of Kyoto. Under Stephen Harper's government, Canada deferred action conditionally, arguing that it could not act in the absence of the United States. Yet, Harper had previously supported unconditional opposition to climate reforms during periods in which the United States was still participating constructively in the COP process. Moreover, after the Obama administration reversed US climate policy ambitions, the Harper government backed off its promise to calibrate the ambition of Canadian climate policy with its US neighbor and began to defer action unconditionally. This suggests an account of climate politics where the actions of other countries can reshape domestic political coalitions *without* shifting concerns over free-riding being the primary force reshaping domestic political dynamics.

By contrast, consider Australia, where a Liberal government under John Howard resisted Kyoto ratification with an appeal to US nonparticipation. Yet, a Labor government won government in 2007 with a promise to ratify the Kyoto Protocol, a promise delivered at COP 13 in Bali. The risks to Australia from US

8. "Memorandum for the President on Climate Change Recommendations from Gene Spirling, Kathleen McGinty, Daniel Tarullo, Jim Sternberg and Todd Stern," Clinton Presidential Records. Speechwriting. Lowell Weiss. Folder "Climate Change 10/22/97 Decision Memos," OA/Box 17200.

9. President George W. Bush, "Letter to Members of the Senate on the Kyoto Protocol and Climate Change," March 13, 2001, available at: <http://www.presidency.ucsb.edu/ws/?pid=45811>, last accessed August 21, 2020.

policy free-riding did not change abruptly; what changed was the balance of political power within Australia (Bailey et al. 2012; Mildenberger 2020).

This Australian episode also highlights a broader issue with relying on data from climate conference attendees as the primary basis for analysis. Individual country representatives who attend COP meetings are not a representative sample of relevant domestic political actors. National climate delegations tend to comprise mostly voices from both Foreign Ministries and Environmental Affairs departments (Schroeder et al. 2012). Yet, these individuals are not always the major power brokers within domestic policy-making spheres. For instance, finance ministries tend to be underrepresented at international meetings and yet are very powerful voices at home. We consider this issue further in Appendix A3, https://doi.org/10.1162/glep_a_00578.

Moreover, it is not even clear that global climate negotiators themselves actually conceive of climate change through a collective action lens. Just as national publics are not climate noncooperators, detailed cognitive study of climate negotiators' conceptual beliefs suggests that elite views may also be inconsistent with the collective action perspective. Milkoreit (2017) undertakes a detailed study of the cognition and mental models of fifty-five climate negotiators representing states and NGOs during the 2012 COP. Her study offers rare insight into elite climate mental models. Ultimately, Milkoreit finds that understanding of the nature of the climate problem is conditioned by actor identity, particularly the ways in which these actors conceive the costs and benefits associated with particular multilateral design architectures. As Milkoreit notes, many negotiators hold rich views of climate change that include strong empathy for and personal identification with developing countries, the global poor, or all of humanity. These actors do not clearly conceive of themselves as representing the interests of their home countries, and instead act as complex moral agents (Milkoreit 2015). A strong concern with climate policy free-riding does not appear central to their mental models or a major cognitive constraint on the beliefs of active climate negotiators—the very individuals who we should expect to act conditionally under both strong and weak versions of collective action theory.

Discussion

Climate scholars have long argued that national climate policy orients around free-riding concerns. Yet, we point to the surprising absence of empirical substantiation for this foundational assumption: domestic distributive conflicts (and not free-riding concerns) tend to act as the binding constraints on cross-national climate policy action. Table 1 reviews select evidence presented so far; for each piece of data, we assess its consistency with the three models of climate policy.

Our analysis suggests that scholars need to be attentive to a series of methodological and inferential problems that compromise theoretical claims about collective action concerns in the climate domain. First, the Byrd–Hagel resolution and Bush Kyoto withdrawal demonstrate the importance of taking *equifinality*

Table 1

Does Empirical Evidence Validate Strong Collective Action (SCA), Weak Collective Action (WCA), or Distributive Conflict (DC) Theories' Predictions?

<i>Empirical observation</i>	<i>Consistent with SCA?</i>	<i>Consistent with WCA?</i>	<i>Consistent with DC?</i>
<i>National policies in absence of institutions to manage free-riding</i>			
Countries enact climate policies unilaterally	×	✓	✓
Carbon prices in many countries after US Kyoto disavowal	×	Unlikely	✓
Renewable energy support after US Kyoto disavowal	×	Unlikely	✓
<i>National publics are unconditional cooperators</i>			
Unconditional support for climate action	×	✓	✓
<i>National political actors behave in a largely unconditional fashion</i>			
Political actors discuss free-riding	✓	✓	✓
Free-riding concerns did not structure Byrd–Hagel resolution	×	Unlikely	✓
Free-riding concerns did not structure Bush Kyoto exit	×	Unlikely	✓
Sample of climate negotiators do not see CC as collective action problem	×	×	✓

Summary of select evidence reviewed in the analysis section. Since some weak collective action predictions (WCA2 and WCA3) are probabilistic, single events cannot falsify predictions; however, we can offer judgments on event likelihood. Our empirical review provides clear empirical evidence against the strong collective action prediction set (SCA1 through SCA3), while raising questions about the observational equivalence of empirical evidence for the weak collection prediction set.

seriously. Empirical evidence congruent with the predictions of collective action theory is often equally congruent with other meta-theoretical accounts. Thus, scholars have linked Bush's withdrawal letter from Kyoto to collective action theory, even though a sharper and more precise empirical account instead points to factional conflict within the Bush administration and the power of unconditional climate policy opponents to drive climate reforms off the agenda. Climate policy inaction can usually be explained equally by both collective action and distributive politics accounts. Yet, climate policy action can often be more parsimoniously explained by distributive politics accounts.

Second, it is important that we not read rhetoric by political actors about collective action as dispositive evidence that the climate problem is, in some

deeper way, structured by this theoretical framework. Many actors who are actually unconditional noncooperators may use collective action rhetoric as a way of strengthening their bargaining positions. We see this clearly with climate policy opponents in Australia, Canada, and the United States, and we label this inferential problem as an issue of *epiphenomenality* to emphasize that surface rhetoric may not reflect underlying behavioral motivations. This concern is generally consistent with critical suggestions that the empirical prevalence of free-riding may be constructed by economic models and individuals learning how to behave consistently with its logic (Tuck 2008).

While our empirical review (Table 1) provides clear empirical evidence against the SCA prediction set (SCA1 through SCA3); these methodological concerns raise more subtle issues of observational equivalence when interpreting the fit between empirical evidence and the WCA prediction set. For example, the distributive conflict approach does not impose restrictions on the source of stakeholders' preferences. From an inferential perspective, this could lead to situations in which collective action and distributive conflict perspectives overlap. Some firms, for instance, may push for reciprocity because they worry about unfair competition. In that case, reciprocity would be predicted by both paradigms. At the same time, we see this as unlikely: most actors hold unconditional preferences. Firms that suffer from a carbon tax will not suddenly support it if other countries impose one as well. They care about their absolute welfare. As a general rule, then, we see their preferences as articulated around domestic considerations.

Generally, scholars have provided some evidence for WCA1: that free-riding concerns are discussed by at least some actors during climate politics debates. However, issues of epiphenomenality and endogeneity complicate efforts to decide whether this rhetoric provides direct evidence in favor of free-riding as a binding constraint on action. The rhetoric may be strategic, or it may stem from a constructed understanding of the problem, rather than speaking to some core aspect of the climate change problem definition. For instance, worries over free-riding can be used to undercut the legitimacy of regimes that are not universal (Hoffmann 2005, 23). Ultimately, WCA1 is necessary but insufficient for collective action theory, because it is equally consistent with all three prediction sets.

By contrast, WCA2 and WCA3 are even more difficult to arbitrate empirically since, as discussed earlier, we cannot observe the counterfactual state of the world under which particular countries did or did not defect from particular climate agreements (e.g., the world in which the United States did not reject Kyoto). Other countries could well have undertaken even more stringent climate policy commitments in this unobserved world.

Yet what matters here is not simply the existence of international climate policy-making interdependence but instead that concerns of free-riding or collective action structure that interdependency. Consider that WCA2 reads, "The probability of countries taking costly climate action will be enhanced if other countries do so *because of reduced free-riding concerns*." Dispositive evidence for collective action theory would require both an observation of increased action probability

and evidence that free-riding concerns shape this probability change. We were not able to identify swing constituencies behaving as conditional cooperators in two prominent US cases routinely cited as empirical examples of collective action behavior in political science scholarship.

Furthermore, collective action theory requires clear empirical facts that are anomalous to distributive conflict perspectives but fully consistent with, minimally, the WCA set. Perhaps the strongest possible evidence that collective action theorists can invoke here is that extant climate talks have focused on multilateral institutions to facilitate monitoring. In other words, climate negotiations have incorporated institutional design elements that seem to respond to collective action accounts.¹⁰ Yet, should we read a climate policy *response* built on an assumption of free-riding as evidence that free-riding matters, when there is otherwise minimal evidence of free-riding concerns in practice? Furthermore, if the collective action theory's best empirical defense is that it is constructed to be true—people believe it so that it becomes real—should researchers continue to uncritically parrot this problem definition? Should we not collectively consider whether alternative problem definitions provide a better intellectual starting point for global climate institutions?

Conclusions

In sum, our review suggests that political scientists must redouble their efforts to understand the problem structure of global climate politics. First, our review suggests the surprising paucity of empirical support for the dominant collective action framework. States do not appear to behave as predicted by this model. Second, it is possible to fully explain patterns of global climate policy making without recourse to free-riding. In an alternative account, governments are the key decision makers, and their survival depends to a large extent on the preferences of domestic constituencies. To the extent that these constituencies do not care about reciprocal action—and we offered evidence that they do not—governments can be insulated from the pressures of free-riding. Instead, climate policy will reflect a mixture of preferences from voters (in democracies) and interest groups. Which account—collective action or distributive politics—best characterizes the current climate politics problem structure is a question for scholars to confront head-on.

This is not to say that the model of distributive politics that we present exhausts the ways to think about climate policy making. Instead, this special section highlights new approaches to making sense of climate politics. The

10. This also, then, raises the question of why the problem was misunderstood, which remains up for debate. Victor (2001, 14) discusses the influence of the success of the Montreal Protocol, which was built along traditional collective action prescriptions. Another hypothesis is that international diplomats will naturally gravitate toward treaties that address foreign failures to comply rather than treaties that are politically effective at home.

strength of the distributive model lies not in its completeness but in its flexibility. It can be adapted to accommodate a wide range of domestic political mechanisms in the policy-making process. Kathryn Harrison's article in this special section, for instance, provides a careful comparative analysis of local politics in Canada and the United States and how it affects coal projects. Global collective action models are blind to these important forces. What is crucial, in our perspective, is to offer robust microfoundations to climate action. Global collective action models fail on that front because states are too often deemed the fundamental player. But a long tradition in international politics acknowledges the importance of micro factors explaining macro outcomes, and vice versa (Gourevitch 1978; Putnam 1988).

This is also not to say that international politics is not a crucial element of this story. Quite the contrary: we believe that international politics both explains where we are and offers solutions to the problem. What our article implies is that there is more to international climate politics than looking for a solution to free-riding. In this special section, Hale envisions new forms of cooperation, which he labels "catalytic." A wide range of global problems can be addressed through the leadership of a proactive country. The mechanism Hale describes relies on a first-moving country investing enough to reduce the cost of action of second movers. The first mover can empower constituencies that will advocate for further reforms, increasing the odds of a beneficial domino effect. This opens up new ways in which international organizations can help address global public bads: not by trying to address free-riding but by strengthening coalitions that can help secure the necessary initial investments into effective policies. Hale's model illustrates the power of models that combine domestic and international politics. Beyond treaties, the article by Bayer and Genovese focuses on the flow of information across borders: information about domestic distributional effects of climate policies is more valued by people than information from abroad. This illustrates that international forces can shape climate policy making in many ways.

What remains to be found are ways to harness these forces. Hale (this issue) provides a framework to think about the role of international institutions when facing catalytic problems. From a policy standpoint, we believe that international institutions can play a critical role in several ways. We suggest here two possibilities and leave further analysis to future research. First, treaties should be designed to empower interest groups. This could be done by funding them or creating demand for their products. Public funding was instrumental, for instance, in the development of the renewable energy industry (Aclin and Urpelainen 2018). Channeling funds toward pro-climate groups constitutes one way in which such interests can endogenously grow and solidify pro-climate policies. Second, international institutions can continue to provide information and help coordinate domestic constituencies. In contrast to the logic underpinning global regimes (where information helps smoothen state-to-state bargaining), information here helps people monitor the action of competitors. International institutions can therefore reduce information asymmetries between carbon interests and pro-climate groups.

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References

- Aklin, Michaël, and Johannes Urpelainen. 2013. Political Competition, Path Dependence, and the Strategy of Sustainable Energy Transitions. *American Journal of Political Science* 57 (3): 643–658. DOI: <https://doi.org/10.1111/ajps.12002>
- Aklin, Michaël, and Johannes Urpelainen. 2018. *Renewables: The Politics of a Global Energy Transition*. Cambridge, MA: MIT Press. DOI: <https://doi.org/10.7551/mitpress/11112.001.0001>
- Aldrich, John, John Sullivan, and Eugene Borgida. 1989. Foreign Affairs and Issue Voting. *American Political Science Review* 83 (1): 123–141. DOI: <https://doi.org/10.2307/1956437>
- Bailey, Ian, Iain MacGill, Rob Passey, and Hugh Compston. 2012. The Fall (and Rise) of Carbon Pricing in Australia. *Environmental Politics* 21 (5): 691–711. DOI: <https://doi.org/10.1080/09644016.2012.705066>
- Barrett, Scott. 2003. *Environment and Statecraft*. Oxford, UK: Oxford University Press.
- Barrett, Scott, and Robert Stavins. 2003. Increasing Participation and Compliance in International Climate Change Agreements. *International Environmental Agreements* 3 (4): 349–376. DOI: <https://doi.org/10.1023/B:INEA.0000005767.67689.28>
- Bättig, Michèle B., and Thomas Bernauer. 2009. National Institutions and Global Public Goods. *International Organization* 63 (2): 281–308. DOI: <https://doi.org/10.1017/S0020818309090092>
- Bayer, Patrick, and Michaël Aklin. 2020. The European Union Emissions Trading System Reduced CO₂ Emissions Despite Low Prices. *PNAS* 177 (16): 8804–8812. DOI: <https://doi.org/10.1073/pnas.1918128117>, PMID: 32253304, PMCID: PMC7183178
- Bayer, Patrick, and Johannes Urpelainen. 2016. It Is All About Political Incentives: Democracy and the Renewable Feed-In Tariff. *Journal of Politics* 78 (2): 603–619. DOI: <https://doi.org/10.1086/684791>

- Bechtel, Michael, and Kenneth Scheve. 2013. Mass Support for Global Climate Agreements Depends on Institutional Design. *PNAS* 110 (34): 13763–13768. DOI: <https://doi.org/10.1073/pnas.1306374110>, PMID: 23886666, PMCID: PMC3752231
- Beiser-McGrath, Liam F., and Thomas Bernauer. 2019. Commitment Failures Are Unlikely to Undermine Public Support for the Paris Agreement. *Nature Climate Change* 9 (3): 248–252. DOI: <https://doi.org/10.1038/s41558-019-0414-z>, PMID: 30886650, PMCID: PMC6420133
- Bernauer, Thomas. 2013. Climate Change Politics. *Annual Review of Political Science* 16: 421–448. DOI: <https://doi.org/10.1146/annurev-polisci-062011-154926>
- Bernauer, Thomas, and Robert Gampfer. 2015. How Robust Is Public Support for Unilateral Climate Policy? *Environmental Science and Policy* 54: 316–330. DOI: <https://doi.org/10.1016/j.envsci.2015.07.010>
- Bernauer, Thomas, Liang Dong, Liam F. McGrath, Irina Shaymerdenova, and Haibin Zhang. 2016. Unilateral or Reciprocal Climate Policy? Experimental Evidence from China. *Politics and Governance* 4 (3): 152–171. DOI: <https://doi.org/10.17645/pag.v4i3.650>
- Calel, Raphael, and Antoine Dechezleprêtre. 2014. Environmental Policy and Directed Technological Change. *Review of Economics and Statistics* 98 (1): 173–191. DOI: https://doi.org/10.1162/REST_a_00470
- Carattini, Stefano, Simon Levin, and Alessandro Tavoni. 2017. Cooperation in the Climate Commons. Working Paper No 292, Centre for Climate Change Economics and Policy.
- Cheon, Andrew, and Johannes Urpelainen. 2013. How Do Competing Interest Groups Influence Environmental Policy? *Political Studies* 61 (4): 874–897. DOI: <https://doi.org/10.1111/1467-9248.12006>
- Daugbjerg, Carsten, and Gert Tinggaard Svendsen. 2001. *Green Taxation in Question*. New York, NY: Palgrave Macmillan.
- Genovese, Federica. 2019. Sectors, Pollution, and Trade: How Industrial Interests Shape Domestic Positions on Global Climate Agreements. *International Studies Quarterly* 63 (4): 819–836. DOI: <https://doi.org/10.1093/isq/sqz062>
- Gourevitch, Peter A. 1978. The Second Image Reversed: The International Sources of Domestic Politics. *International Organization* 32 (4): 881–912. DOI: <https://doi.org/10.1017/S002081830003201X>
- Harrison, Kathryn. 2015. International Carbon Trade and Domestic Climate Politics. *Global Environmental Politics* 15 (3): 27–48. DOI: https://doi.org/10.1162/GLEP_a_00310
- Harrison, Kathryn, and Lisa McIntosh Sundstrom. 2007. The Comparative Politics of Climate Change. *Global Environmental Politics* 7 (4): 1–18. DOI: <https://doi.org/10.1162/glep.2007.7.4.1>
- Heitzig, Jobst, Kai Lessmann, and Yong Zou. 2011. Self-Enforcing Strategies to Deter Free-Riding in the Climate Change Mitigation Game and Other Repeated Public Good Games. *PNAS* 108 (38): 15739–15744. DOI: <https://doi.org/10.1073/pnas.1106265108>, PMID: 21903930, PMCID: PMC3179122
- Hoffmann, Matthew J. 2005. *Ozone Depletion and Climate Change: Constructing a Global Response*. Albany, NY: SUNY Press.
- Houle, David, Erick Lachapelle, and Mark Purdon. 2015. Comparative Politics of Sub-federal Cap-and-Trade: Implementing the Western Climate Initiative. *Global Environmental Politics* 15 (3): 49–73. DOI: https://doi.org/10.1162/GLEP_a_00311
- Hughes, Llewelyn, and Johannes Urpelainen. 2015. Interests, Institutions, and Climate Policy: Explaining the Choice of Policy Instruments for the Energy Sector. *Environmental Science and Policy* 54: 52–63. DOI: <https://doi.org/10.1016/j.envsci.2015.06.014>

- Keohane, Robert O. 1984. *After Hegemony*. Princeton, NJ: Princeton University Press.
- Keohane, Robert O., and David G. Victor. 2016. Cooperation and Discord in Global Climate Policy. *Nature Climate Change* 6 (6): 570–575. DOI: <https://doi.org/10.1038/nclimate2937>
- Kindleberger, C. P. 1973. *The World in Depression: 1929–1939*. London, UK: Allen Lane.
- Lachapelle, Erick, and Matthew Paterson. 2013. Drivers of National Climate Policy. *Climate Policy* 13 (5): 547–571. DOI: <https://doi.org/10.1080/14693062.2013.811333>
- Lachapelle, Erick, Robert MacNeil, and Matthew Paterson. 2017. The Political Economy of Decarbonisation. *New Political Economy* 22 (3): 311–327. DOI: <https://doi.org/10.1080/13563467.2017.1240669>
- Li, Hui, Robert P. Berrens, Alok K. Bohara, Hank C. Jenkins-Smith, Carol L. Silva, and David L. Weimer. 2004. Would Developing Country Commitments Affect US Households' Support for a Modified Kyoto Protocol? *Ecological Economics* 48 (3): 329–343. DOI: <https://doi.org/10.1016/j.ecolecon.2003.10.010>
- Lipsy, Phillip Y. 2018. The Institutional Politics of Energy and Climate Change. Unpublished manuscript.
- Meckling, Jonas. 2011. *Carbon Coalitions*. Cambridge, MA: MIT Press. DOI: <https://doi.org/10.7551/mitpress/9078.001.0001>
- Mendelsohn, Robert, Ariel Dinar, and Larry Williams. 2006. The Distributional Impact of Climate Change on Rich and Poor Countries. *Environment and Development Economics* 11 (2): 159–178. DOI: <https://doi.org/10.1017/S1355770X05002755>
- Mildenberger, Matto. 2020. *Carbon Captured: How Business and Labor Control Climate Politics*. Cambridge, MA: MIT Press. DOI: <https://doi.org/10.7551/mitpress/12393.001.0001>
- Milewicz, Karolina M., and Duncan Snidal. 2016. Cooperation by Treaty. *International Organization* 70 (4): 823–844. DOI: <https://doi.org/10.1017/S002081831600031X>
- Milkoreit, Manjana. 2015. Hot Deontology and Cold Consequentialism—An Empirical Exploration of Ethical Reasoning Among Climate Change Negotiators. *Climatic Change* 130 (3): 397–409. DOI: <https://doi.org/10.1007/s10584-014-1170-8>
- Milkoreit, Manjana. 2017. *Mindmade Politics*. Cambridge, MA: MIT Press. DOI: <https://doi.org/10.7551/mitpress/10795.001.0001>
- Milner, Helen, and Dustin Tingley. 2015. *Sailing the Water's Edge: The Domestic Politics of American Foreign Policy*. Princeton, NJ: Princeton University Press. DOI: <https://doi.org/10.1515/9781400873821>
- Mitchell, Ronald B. 2006. Problem Structure, Institutional Design, and the Relative Effectiveness of International Environmental Agreements. *Global Environmental Politics* 6 (3): 72–89. DOI: <https://doi.org/10.1162/glep.2006.6.3.72>
- Nordhaus, William. 2015. Climate Clubs: Overcoming Free-Riding in International Climate Policy. *American Economic Review* 105 (4): 1339–1370. DOI: <https://doi.org/10.1257/aer.15000001>
- Nordhaus, William, and Zili Yang. 1996. A Regional Dynamic General-Equilibrium Model of Alternative Climate-Change Strategies. *American Economic Review* 86 (4): 741–765.
- Ostrom, Elinor. 1990. *Governing the Commons*. Cambridge, UK: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511807763>
- Ostrom, Elinor. 2009. A Polycentric Approach for Coping with Climate Change. Policy Research Working Paper 5095, World Bank. DOI: <https://doi.org/10.1596/1813-9450-5095>
- Purdon, Mark. 2015. Advancing Comparative Climate Change Politics. *Global Environmental Politics* 15 (3): 1–26. DOI: https://doi.org/10.1162/GLEP_e_00309

- Putnam, Robert. 1988. Diplomacy and Domestic Politics: The Logic of Two-Level Games. *International Organization* 42 (3): 427–460. DOI: <https://doi.org/10.1017/S0020818300027697>
- Sandler, Todd. 2004. *Global Collective Action*. Cambridge, UK: Cambridge University Press. DOI: <https://doi.org/10.1017/CBO9780511617119>
- Schroeder, Heike, Maxwell Boykoff, and Laura Spiers. 2012. Equity and State Representations in Climate Negotiations. *Nature Climate Change* 2 (12): 834. DOI: <https://doi.org/10.1038/nclimate1742>
- Sell, Susan. 1996. North-South Environmental Bargaining: Ozone, Climate Change, and Biodiversity. *Global Governance* 2: 97. DOI: <https://doi.org/10.1163/19426720-002-01-90000007>
- Sommerer, Thomas, and Sijeong Lim. 2016. The Environmental State as a Model for the World? An Analysis of Policy Repertoires in 37 Countries. *Environmental Politics* 25 (1): 92–115. DOI: <https://doi.org/10.1080/09644016.2015.1081719>
- Stavins, Robert. 2011. The Problem of the Commons. *American Economic Review* 101 (1): 81–108. DOI: <https://doi.org/10.1257/aer.101.1.81>
- Stern, Nicholas. 2007. *The Economics of Climate Change*. Cambridge, UK: Cambridge University Press.
- Stokes, Leah. 2015. Electoral Backlash Against Climate Policy. *American Journal of Political Science* 60 (4): 958–974. DOI: <https://doi.org/10.1111/ajps.12220>
- Tingley, Dustin, and Michael Tomz. 2013. Conditional Cooperation and Climate Change. *Comparative Political Studies* 47 (3): 344–368. DOI: <https://doi.org/10.1177/0010414013509571>
- Tuck, Richard. 2008. *Free Riding*. Cambridge, MA: Harvard University Press.
- Tvinnerheim, Endre, Erick Lachapelle, and Christopher Borick. 2017. Is Support for International Climate Action Conditional on Perceptions of Reciprocity? *Cosmos* 12 (1): 1–13.
- Victor, David G. 2001. *The Collapse of the Kyoto Protocol*. Princeton, NJ: Princeton University Press.
- Victor, David G. 2011. *Global Warming Gridlock*. Cambridge, UK: Cambridge University Press.
- Weitzman, Martin L. 2017. On a World Climate Assembly and the Social Cost of Carbon. *Economica* 84 (336): 559–586. DOI: <https://doi.org/10.1111/ecca.12248>