
Rational design in motion: Uncertainty and flexibility in the global climate regime

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Abstract

Recent International Relations scholarship offers valuable rational choice explanations for the design of international institutions. However, the rational design literature has relied heavily on institutional outcomes as evidence for testing models. Such studies must be complemented by research designs that analyze the decisions and bargaining that drive design choices in order to expose causal mechanisms and test a wider range of observable implications. I assess an important rational design hypothesis, that uncertainty leads to flexible institutions, by analyzing the negotiations behind the climate change regime and by considering two distinct institutional outcomes across time. While the hypothesis receives considerable support, significant behavior and outcomes do not conform to its logic. I propose refinements for rational design theory in general and work on uncertainty and flexibility in particular. Rational choice theory speaks to the process of institutional design and should not content itself with predicting — and testing itself against — equilibrium outcomes.

Keywords

climate change, institutional design, institutions, rational choice theory, research design, uncertainty

Introduction

The international politics of global warming are more interesting and critical than ever, with fresh warnings of the potentially dramatic impacts of human induced change (IPCC, 2007; Stern, 2007) and increasingly urgent efforts by governments to both implement Kyoto Protocol commitments and negotiate a successor regime (Aldy and Stavins, 2010). Climate change is now routinely on the agenda of the Group of Eight and even the UN

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Security Council, cementing its place as an economic and security issue as well as an environmental one. The scale and complexity of the problem — its truly global nature, the clear incentives to free-ride on the efforts of others, and the need to regulate domestic-level behavior — has required among the most ambitious and politically nettlesome projects in the history of international law. For students of International Relations interested in institutions and their design, the climate regime presents a fascinating and intrinsically important case.

This article addresses whether and how the presence of uncertainty drove the most important feature of the regime, its flexibility, and contributes theoretically and empirically to the literature on institutional design at the international level. In recent years, International Relations scholars working in the rationalist tradition have investigated how institutions vary in systematic ways depending on prevailing conditions, such as the number of actors involved, the available information, distributive concerns, enforcement and monitoring problems, and various other sources of transaction costs (Downs and Rocke, 1995; Koremenos, 2001, 2005; Koremenos et al., 2004; Lake, 1999; Rosendorff, 2005; Yarbrough and Yarbrough, 1992). This has helped the field move beyond debates about whether international institutions matter to focus more precisely on how they matter, that is, how alternative designs address specific cooperation problems.

Despite its valuable contributions, the rational design literature suffers from important theoretical and empirical limitations. First, the empirical evidence adduced in much rational design work does not directly address the underlying theory and overlooks the variety of possible observable implications. After building on rational choice logic, most studies present hypotheses in a more functionalist form — cooperation problem X leads to institutional feature Y — and then describe the institutional outcome to establish that it is consistent with the relevant prediction. This research design says little about causation, prevents us from considering alternative explanations for the same outcome, and gives us an incomplete — and sometimes even misleading — picture of design choices. Based on the premise that a rational choice argument is best supported by evidence of rational choices, I argue that a key empirical strategy for assessing rational design theory is to analyze the strategic decisions that lead to the creation and subsequent modification of the institution. Such evidence on the design process is at least as important as institutional outcomes for assessing models of institutional design.

Second, the central constructs of rational design — the cooperation problems and institutional dimensions — are not sufficiently disaggregated and their interactions have not been adequately explored. While the key variables have been identified at a general level, we still require more nuanced predictions that both extend the theoretical logic and better capture the contours of real-world situations. Using the case study to generate suggestions, the article moves in this direction by offering more fine-grained propositions on the uncertainty–flexibility relationship.

Among these propositions, I argue that uncertainty about the state of the world can be more *general*, affecting all actors, or more *particularistic*, affecting certain actors disproportionately. These two types of uncertainty create incentives for different types of flexibility. General uncertainty creates a need for *transformative* flexibility, which allows the institution itself to be changed so that all actors can respond to new information, while particularistic uncertainty calls for *adaptive* forms of flexibility, which allow certain

actors to depart from institutional rules while the institution itself remains stable. I also identify a distinct form of flexibility, *means flexibility*, which has both adaptive and transformative properties and therefore provides an especially robust response to uncertainty.

I consider design 'in motion' in two senses. My theoretical focus on flexibility addresses those features that allow international institutions and commitments to change over time. My research design then analyzes the process of institutional creation and, by taking multiple 'snapshots' of institutional outcomes, explicitly considers how they change over time in response to shifts in underlying cooperation problems. Examining the same institution over time has the virtue of allowing us to control for countless factors specific to the issue-area and actors involved. While rationalist scholars typically treat institutions as equilibria and focus on single outcomes, they need not confine themselves in this way: rational choice theory has much to say about the process of institutional creation and evolution, and can contribute to this theoretical territory alongside other traditions.

In the next section I review the literature on the rational design of international institutions, with particular attention to research design issues. I then present my central hypothesis, that uncertainty creates incentives for efficient flexibility, and outline a set of observable implications. I also introduce two competing explanations: that power and compliance costs explain states' positions on flexibility. A case study of climate change institutions follows. I discuss the major forms of uncertainty in the issue-area and explore the extent to which institutional flexibility has been employed as a response. While the efficient flexibility hypothesis works well to explain the Kyoto Protocol (the institutional outcome as of 1997), it does not explain subsequent changes to the regime whereby enhanced flexibility resulted from more selfish distributive concerns and bargaining power. In other words, while uncertainty and institutional flexibility were evident throughout, the causal link between them breaks down over time. The penultimate section discusses implications for rational choice arguments of institutional design and a final section summarizes and concludes.

Uncertainty and the rational choice of flexibility

The rational design research program represents an important theoretical shift in the field and offers sophisticated arguments about how institutions are structured. For example, the most comprehensive treatment explains the scope, centralization, decision-making rules, and flexibility of institutions as a function of distribution and enforcement problems, the number and asymmetry of actors involved, and uncertainty (Koremenos et al., 2004). Several studies focus on the problem of opportunism and commitment, which are countered with governance structures that tie hands through hierarchy or third-party enforcement (Eilstrup-Sangiovanni and Verdier, 2005; Lake, 1999; Yarbrough and Yarbrough, 1992). Others explain institutional variation on the dimensions of legalization and independence (Goldstein et al., 2001; Haftel and Thompson, 2006).

The nexus between *uncertainty* as a barrier to efficient cooperation and *flexibility* as an institutional solution has received the most recent attention among International Relations and law scholars. In studies of economic, environmental, and security arrangements, institutional flexibility in diverse forms is attributed to various sources of uncertainty about the state of the world (Downs and Rocke, 1995; Koremenos, 2001, 2005;

Morrow, 2001; Raustiala, 2005; Rosendorff, 2005; Rosendorff and Milner, 2001; Schwartz and Sykes, 2002). This uncertainty is conceptualized as random exogenous factors that might make the terms of the agreement increasingly undesirable over time, reducing the overall gains and altering the distribution of gains in unanticipated ways (Harris and Holmstrom, 1987; Koremenos, 2001). For international actors, uncertainty over future economic, technological, and domestic political circumstances sometimes makes it impossible to know the precise consequences of alternative actions. States accommodate this uncertainty with institutional designs that allow the parties to adjust the agreement as prevailing circumstances change (e.g. renegotiation provisions) or that allow individual parties to adjust their behavior, usually temporarily, as their own circumstances change (e.g. through escape clauses or flexible non compliance mechanisms). Koremenos et al. (2001a: 773) capture this distinction as *transformative* versus *adaptive* flexibility.

The dual focus on uncertainty and flexibility is not surprising since institutional design is inexorably linked to both variables. 'But for uncertainty,' writes Oliver Williamson (1985: 30) 'problems of economic organization are relatively uninteresting.' For its part, flexibility reflects the basic tension inherent in all long-term contracts, that between 'the need to fix responsibilities at the outset and the need to readjust them over time' (Baird, 1990: 586). Uncertainty militates against rigid commitments. Flexibility mechanisms allow parties to forge cooperation despite uncertainty and to maintain the viability of agreements over time.¹

The focus on outcomes

The rational design literature often employs research designs that only weakly link the evidence adduced to the underlying causal mechanisms. Each study referenced above begins with a model of institutional design, where some cooperation obstacle X is hypothesized to lead actors to design an institution with feature Y. As their central empirical strategy, most scholars make a plausible case for the presence of factor X and then demonstrate that the resulting institution does indeed contain feature Y. In other words, using the institutional outcome as evidence, they establish a correlation between the independent and dependent variables.

Studies of the GATT/WTO offer typical examples. To support their economic explanation of WTO dispute settlement as a mechanism intended to facilitate efficient breach, a form of flexibility, Schwartz and Sykes (2002) simply summarize the various features of the system as reflected in the Dispute Settlement Understanding (DSU). Without considering alternatives, they conclude that, 'We can see no other purpose to the provisions' than as a means to allow efficient departures from the rules (Schwartz and Sykes, 2002: 192). Similarly, Downs and Rocke (1995) present a formal model to show how the GATT might be designed to respond flexibly to violations in order to accommodate government uncertainty over changing domestic political demands. After describing some key features of the GATT, they conclude that, 'The structure of the international trade regime provides a striking example of how domestic uncertainty shapes the operation of international institutions,' and infer further that, 'States did not want aggressive enforcement of the GATT because most of them knew that they themselves would eventually find it

advantageous to depart from the free trade standard' (Downs and Rocke, 1995: 88, 99). Finally, Rosendorff finds that the flexible design of the DSU is 'consistent' with his model's predictions and, while recognizing the limits of his research design, devotes only a paragraph to the bargaining that produced it (Rosendorff, 2005: 391, 397–398).

While these explanations of GATT/WTO design are quite plausible, minimal or no evidence is offered to support the rational choice logic that the institutional features were chosen for the reasons purported, despite frequent assertions of what states and the treaty framers 'intended' and 'wanted.' There is also little effort to consider alternative explanations for the same design features. Merely showing congruence between independent and dependent variables is appealing since it does not require much data about a given case, but it sheds little light on the nature of causation (George and Bennett, 2005: 182–183).

For the most part, contributors to Koremenos et al.'s (2004) *Rational Design of International Institutions* volume adopt the same approach: they provide qualitative descriptions of one to three institutions to support one or more design hypotheses. Evidence on negotiations and bargaining behavior, and whether it conforms to rational choice predictions, is scant.² This may be partly the result of a failure to delineate the precise causal mechanisms underlying rational design, which obscures the full range of empirical implications. While the volume's editors build on rational choice theory, their hypotheses are stated in terms of simple relationships between independent and dependent variables — for example, they conjecture that 'Flexibility increases with uncertainty about the state of the world' (Koremenos et al., 2001a: 793) — that reflect no intentionality (Wendt, 2001). Such relationships constitute only one observable implication of a rational choice hypothesis on institutional design.

It should be noted that large-*n* analysis has clear advantages over case studies, which dominate empirical work in IR, when it comes to establishing design correlations. Those who have gathered and analyzed data on institutional design have been able to establish relationships with greater confidence and to control for other influences on institutional outcomes (Haftel and Thompson, 2006; Koremenos, 2005; Smith, 2000). As more data are gathered, the potential for understanding the determinants of design will increase further. Nevertheless, correlations, whether qualitative or quantitative, are not sufficient to establish causation or to capture many important implications of rational design theory.

The strategic process of design

Ultimately, the best evidence for a rational choice argument exposes the rational choices themselves (Elster, 2000: 693). As noted by proponents of the 'analytical narratives' approach to understanding institutions with rational choice, we should account for outcomes by 'identifying and exploring the mechanisms that generate them,' which involves tracing processes and examining 'the choices of individuals who are embedded in specific settings' (Bates et al., 1998: 9, 12).³ For an argument on international institutional design, this means analyzing the positions adopted by actors during negotiations and the strategic interactions among them that produce outcomes.

Looking at regime negotiations is valuable for several reasons. First, it allows us to assess whether choices were made for the hypothesized reasons — that is, to establish

causation and intentionality. Second, looking at negotiations gives us a more *political* view on the process of regime design than does a correlational approach. This is especially helpful since models borrowed from economics often do not capture the political conflict and preference aggregation underlying institutional formation (Kahler and Lake, 2003). Third, a detailed look at the design process sheds light on how states choose among institutional alternatives that serve as substitute solutions to the cooperation dilemma they face. Put differently, it addresses the question of how states choose among different equilibria. Fourth, looking at how actors choose institutional features may uncover evidence that supports our argument even when the institutional outcome does not. Intentions to rationally design an institution may be inhibited by path-dependence or constraints imposed by existing institutional structures (Diermeier and Krehbiel, 2003; Pierson, 2004). In such cases the framers nevertheless may have sought an efficient institution consistent with rational choice predictions. Finally, and more generally, in-depth case analysis contributes to theoretical development by clarifying conceptual categories and generating new or refined hypotheses (Lijphart, 1971; Ragin, 2004), a valuable function during these early stages of the rational design research program.

Hypothesis and observable implications

The value of these research design recommendations becomes clearer if we think systematically about the observable implications of a rational choice hypothesis regarding institutional design. My main hypothesis captures the standard rational design argument regarding uncertainty and flexibility in rational choice terms:

Hypothesis: Faced with uncertainty about the state of the world, actors have incentives to design institutions with flexibility.

It is clear that the presence of a flexible institution, as the equilibrium point prediction, constitutes only one possible observation for assessing this hypothesis (Morton, 1999). Table 1 offers a broader set of empirical implications (applicable to rational design models more generally).

Looking at Implications 1 and 5 alone, as most correlational case studies do, tells us very little about institutional design choices. Almost every issue area is characterized by some uncertainty, so we are bound to find uncertainty if we are looking for it (Duffield,

Table 1. Observable implications of uncertainty–flexibility hypothesis

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1. The issue in question is characterized by uncertainty
 2. Actors are concerned with uncertainty as a barrier to cooperation
 3. Actors consider flexibility as a solution to the uncertainty problem
 4. Actors bargain over the nature of flexibility
 5. The institutional outcome is consistent with the prediction, i.e. it is flexible
 6. Cooperation problems with greater uncertainty are associated with more flexible institutions, on average
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2002: 424). This is why Implication 2 is so important: it tells us that actors are indeed motivated by concerns over uncertainty in making design choices. The same problem arises with Implication 5: virtually all international institutions contain some features that provide flexibility; after all, writing a complete and fully binding contract for most ongoing international issues is impossible. To support a rational choice hypothesis, we must know if actors sought flexibility *because of* uncertainty. Implications 3 and 4 are designed to consider this additional information. Implication 4 reflects the existence of multiple cooperative equilibria even when states agree on flexibility. If states maximize and if the choice among these outcomes is consequential (both assumptions of rational choice institutionalism), then we should expect meaningful bargaining among negotiators. Implication 6 is the focus of quantitative studies of institutional design and is not amenable to a single-case approach. We expect institutional flexibility and issue uncertainty to be correlated across cases, other things being equal.

With these observable implications in mind, it becomes clear that looking beyond outcomes is necessary for a thorough assessment of rational design hypotheses. Conducting research around this broader set of predictions helps us establish whether institutional design is motivated by the concerns and trade-offs identified in the theory.

Alternative explanations

If uncertainty is indeed associated with flexibility in the climate case, it nevertheless may not be the result of efficient design choices. The rationalist literature on international institutions suggests other motivations for states designing agreements, two of which stand out.⁴ First, *power* is likely to shape institutions even when they provide benefits to all (Krasner, 1991). In general, power has not played an important enough role in rational choice approaches to the study of political institutions (Moe, 2005). Indeed, Koremenos et al. (2001b: 307) make an explicit choice to omit power considerations in developing their conjectures. If power is important, we should see that institutional flexibility reflects the preferences of more powerful states.

Other rationalists emphasize self-interested choices driven by concerns over *compliance costs*. This can produce uniform incentives for regime design: if all actors are concerned with the costs of compliance, they will build a 'shallow' regime that requires little change in behavior (Downs et al., 1996). However, if compliance costs vary across states, distributive issues arise- some will prefer a shallow agreement and others a deeper one (Verdier, 2008). Since flexibility lowers the costs of an agreement and thus serves as a partial substitute for shallowness, it is especially important to consider the cost motivation: omitted variable bias is most dangerous when the variable left out is systematically correlated with the included explanatory variable. If the cost logic is important we should see that states with higher compliance costs push harder for institutional flexibility.

To be clear, rational design theory does not necessarily assume that institutions are optimally designed. However, it is premised on the notion that institutions represent an 'efficient equilibrium' (Rosendorff and Milner, 2001: 831) insofar as they are Pareto improving and solve joint cooperation problems, and that actors choose collectively 'superior institutional solutions' (Abbott and Snidal, 2000: 421) over inferior ones after considering the costs and benefits of alternatives. The influence of power and uneven

compliance costs will tend to work against efficiency and to produce institutions that reflect the interests of some states over others. Regardless of the outcome, the two alternative explanations also imply different motivations and behavior during the negotiation process. It should be noted that these logics for institutional design are not mutually exclusive, and we may see all three — a search for efficient flexibility, the imposition of powerful states' preferences, and a desire to lower compliance costs — at play at a given point in the design process and different stages of the institution's evolution.

Case selection and background

The global climate change regime is an ideal case for assessing the uncertainty–flexibility hypothesis and ‘design in motion’ more generally. First, it addresses a prominent issue of obvious interest to academics and policymakers. Second, policymaking and negotiations surrounding the climate issue are relatively transparent, which is important given the research strategy pursued here. Third, there are multiple distinct outcomes when it comes to global climate treaties, which allows us to look at different institutional snapshots over time.

Most importantly, there are sound research design rationales for investigating the climate case, especially as a complement to existing studies. A number of formal models demonstrate a relationship between uncertainty and flexibility (Downs and Rocke, 1995; Koremenos, 2001; Rosendorff, 2005), and quantitative empirical work seems to confirm this expectation. For example, Koremenos (2005) codes environmental agreements in volving pollution abatement as ‘high uncertainty’ cases, and finds a statistical correlation between uncertainty and flexibility across institutional outcomes. In this respect, climate represents a likely case for finding a relationship between uncertainty and flexibility and any deviations from rational design expectations are thus inferentially valuable and noteworthy. From the perspective of mixed-methods principles, the analysis presented here takes a case that falls ‘on the line’ of quantitative studies but addresses questions that are unanswered by them (regarding intentionality and causal mechanisms) and with a different source of data (the design process) (Lieberman, 2005). This qualitative study thus complements and speaks to existing quantitative and formal work.

In addition to accounts of the negotiations by journalists and academics, the case study relies on five sources of primary evidence: (1) detailed meeting summaries from the International Institute for Sustainable Development's *Earth Negotiations Bulletin* (ENB);⁵ (2) an exhaustive firsthand account of the Kyoto Protocol negotiations commissioned by the Climate Secretariat (Depledge, 2000); (3) Secretariat documents containing national proposals and negotiated agreements; (4) government documents from key delegations; and (5) interviews with policymakers and practitioners from various states (including the United States, Canada, and Europe) and international organizations (the World Meteorological Organization, the Organisation for Economic Co-operation and Development, and the World Trade Organization), most of whom participated in the negotiations.⁶

An important product of the 1992 Earth Summit in Rio de Janeiro was the UN Framework Convention on Climate Change (FCCC), the first international treaty

addressing climate. It calls on industrialized states (those listed in Annex 1 to the Convention) to take the lead in reducing greenhouse gas emissions but imposes no binding commitments. Faced with increasing emissions and new evidence on the dangers of climate change, the first Conference of the Parties (COP 1) to the FCCC met in Berlin in 1995 to discuss the possibility of a new and more effective treaty. COP 1 produced the 'Berlin Mandate,' an agreement to adopt a protocol containing binding, quantified emissions reduction commitments by COP 3, to be held in Kyoto in December 1997. To spearhead the negotiations, the parties formed the Ad Hoc Group on the Berlin Mandate (AGBM), which met eight times.

After intense negotiations, the Kyoto Protocol was adopted by 159 nations on 11 December 1997. It limits each Annex 1 state to an 'assigned amount' that represents its target for reductions by the end of the first commitment period of 2008–12. These targets average 5.2 percent below 1990 levels. For Kyoto to enter into force, two criteria were established: 55 countries must ratify the treaty, and enough Annex 1 countries must ratify to account for 55 percent of that group's total emissions. Two years after Kyoto was completed, by the end of 1999, less than 10 percent of total emissions were covered by ratifications. Important holdouts included the United States (36.1% of emissions), the EU (24%), Russia (17.4%), Japan (8.5%), and Canada (3.3%). It was clear that the regime needed more work.

Negotiating efforts after Kyoto focused on filling in the institutional details — Kyoto was vague and incomplete on several fronts. The Buenos Aires Plan of Action, produced by COP 4, established a roadmap for addressing these unresolved issues. The most important post-Kyoto negotiations then took place at COP 6 and COP 7. After a stalemate in The Hague in 2000, COP 6 resumed in Bonn the following year — a session sometimes referred to as COP 6.5 — and resulted in a set of ministerial decisions collectively known as the Bonn Agreement, which settled a number of political disputes. COP 7 achieved a unified framework for implementing Kyoto in more than 200 pages of treaty text known as the Marrakesh Accords.

Focusing on a handful of key states and blocs that drove the negotiations, I analyze regime design efforts from the time of the Berlin Mandate through COP 7, by which point most details had been settled. Table 2 lists the key meetings.

Uncertainty, flexibility, and the road to Kyoto

This section analyzes the negotiations that led to the signing of the Kyoto Protocol in December 1997. After discussing the types of uncertainty that plague the climate issue, I describe how negotiators built substantial flexibility into Kyoto as an institutional response.

Concerns over uncertainty

Over the climate regime's history, scientific uncertainty has diminished overall but new concerns have arisen. Three related categories of uncertainty about the state of the world have hampered cooperation. First, there is uncertainty about the severity of the global

Table 2. Selected post-framework convention climate negotiations

	Date	Meeting	Location
1995	March–April	COP 1 'Berlin Mandate' adopted 7 April	Berlin
	August	AGBM 1	Geneva
	October–November	AGBM 2	Geneva
1996	March	AGBM 3	Geneva
	July	COP 2, AGBM 4	Geneva
	December	AGBM 5	Geneva
1997	March	AGBM 6	Bonn
	July–August	AGBM 7	Bonn
	October–November	AGBM 8	Bonn, Kyoto
	December	COP 3 Kyoto Protocol adopted 11 December	Kyoto
1998	November	COP 4 Buenos Aires Plan of Action adopted 14 November	Buenos Aires
1999	November	COP 5	Bonn
2000	November	COP 6	The Hague
2001	July	COP 6.5 (resumed session) Bonn Agreement reached 23 July	Bonn
	November	COP 7 Marrakesh Accords adopted 10 November	Marrakesh

Note: COP refers to the Conference of the Parties, and AGBM refers to the Ad Hoc Group on the Berlin Mandate.

warming problem. Models of temperature change, sea-level rise, and other aggregate impacts are still incomplete and generate a range of predictions. Atmospheric processes are notoriously complex, and this is especially acute with climate change since human behavior interacts with natural variables. As the IMF (2008: 139) notes, 'there is only incomplete information about how rapidly [greenhouse gas] concentrations will grow in the future, how sensitive climate and biological systems will be to increased concentrations of GHGs, and where the "tipping points" are, beyond which catastrophic climate events can occur.' In light of these unknowns, US policymakers were advised in the early 1990s that 'most policy decisions made in the near future about how to respond to the specter of climate change will be made in light of great uncertainty about the nature and magnitude of potential effects' (Office of Technology Assessment, 1993: 2).

Second, there is uncertainty regarding the regional and local impacts of climate change. Impact assessments suffer from an incomplete grasp of the 'regional details' of climate change (Tol et al., 2003). This is exacerbated by the difficulty of predicting how well firms and people will adapt to change across time and space (Stern, 2007: 148–149), and

to what extent technological innovations will ease such adaptation. For these reasons, both within countries and across sectors, predictions on impacts vary widely. For political leaders at various levels, this makes it difficult to produce useful assessments comparing different levels of action versus a 'business-as-usual' baseline.

Third, there is uncertainty regarding the costs and benefits of different policy options. Decision-makers simply do not have sufficient information to anticipate the effects of alternative policies (Dowlatabadi, 2003). Predicting the costs of limiting carbon dioxide (CO₂) concentrations in the atmosphere is an inexact science, with divergent model results depending on assumptions about technology, the combination of policies deployed, and natural processes (Edmonds and Sands, 2003). Moreover, the benefits of mitigation policies, in terms of reduced impacts, may be felt far in the future and in different locations from where the costs of emissions abatement are incurred. This complexity and 'ubiquitous uncertainty' makes straightforward cost–benefit analysis for policymakers impossible (Corfee-Morlot and Agrawala, 2004: 197).

The second and third sources of uncertainty have arguably been a more important barrier to policymaking than the first since they render estimates of distributive implications for economic actors and political constituencies so difficult to make. There is an interaction effect between these two sources of uncertainty since we cannot know the net benefits of a mitigation policy unless we know the consequences of inaction. As a Chinese delegate noted during the Kyoto negotiations, 'global projections alone are far from enough for countries and regions to formulate policies and strategies' (*ENB*, 11 March 1996: 5). These various uncertainties made states nervous about subjecting themselves to binding targets, which were not agreed to until the final night of the Kyoto negotiations.

These concerns were obvious in the early phases of the Kyoto negotiations. A central focus of the first session of the AGBM, in August 1995, was on the need to gather more information on impacts and policy alternatives. The principal debate was over how much effort to expend on 'analysis and assessment' before substantive negotiations could begin. The United States argued that more information was needed on the 'economic and environmental consequences of actions and inaction' (*ENB*, 28 August 1995: 2). In a March 1996 meeting, developing country delegates asked an IPCC representative about the regional impacts of climate change and were told that 'predictions of climate change at smaller scales are not yet accurate' (*ENB*, 11 March 1996: 4, 13). Observable Implications 1 and 2 are clearly evident at this stage.

While all delegations were concerned with uncertainty, it was further politicized by some and incorporated into bargaining strategies. At the first session of the AGBM, Saudi Arabia repeatedly called for more time to gather information, including evaluations of the economic costs and environmental impacts of *each proposal* made by the FCCC member states, before beginning negotiations (*ENB*, 28 August 1995: 4). Saudi Arabia, Iran, and Kuwait made similar arguments for delay at AGBM 2 (*ENB*, 7 November 1995: 2). The representative of the Alliance of Small Island States (AOSIS) argued by contrast that the existence of uncertainty did not justify 'an open season' for information gathering, which should in any case be left to the IPCC (*ENB*, 28 August 1995: 4). While the Europeans recognized the uncertainty, they agreed that it should not justify delay and called for a precautionary approach (*ENB*, 11 March 1996: 3).

Professed assessments of uncertainty have varied across time and across governments, suggesting that the issue is a political as well as a technical one. While European policymakers were insisting that ‘the science issue is behind us,’⁷ their American counterparts felt that scientific uncertainty ‘is still a big topic of conversation.’⁸ In a statement to COP 6, OPEC’s Secretary General referred dismissively to the ‘claimed effects of climate change’ (OPEC, 2000). As the specter of a binding treaty grew, so did the propensity of certain states — including oil exporters (such as Saudi Arabia, Iran, and Kuwait), timber exporters (especially Brazil), and large consumers of fossil fuels (especially the United States and Japan) — to stress uncertainty regarding impacts and the costs of mitigation strategies. So while there was objective uncertainty and real concern over its effects throughout the negotiations, its role was influenced by politics, complicating the standard rational design treatment of uncertainty as a purely exogenous variable.

Choosing flexibility

Governments negotiating Kyoto responded to uncertainty in a manner broadly consistent with rational design predictions. Flexibility came to be seen as a way to adjust national policy and the agreement itself as new information about climate change and climate policy was gained. Before Kyoto, as Observable Implication 3 predicts, policy advisors in the United States explicitly recommended flexibility as a means of accommodating uncertainty. The Office of Technology Assessment (1993: 16) touted the virtues of flexibility: ‘Flexibility would not preclude potentially desirable actions or lock policy makers into expensive, irreversible decisions.’ After describing the ‘significant uncertainties in knowledge’ surrounding climate, Clinton’s scientific advisors recommended that policies ‘should evolve over time, as new scientific insights are developed’ (US Global Change Research Program, 1994: 5, 15). Similarly, Canada’s Environment and Energy Ministers both recommended steering the Kyoto negotiations toward ‘maximum flexibility’ in seeking solutions (Environment Canada, 1997).

British Prime Minister John Major’s advisors made similar recommendations leading into the Kyoto negotiations, emphasizing the importance of utilizing ‘the full range of policy tools available’ (Department of the Environment, 1994: 7). His Environment Minister suggested that, in light of uncertainty and the fact that ‘future events may change,’ the UK should advocate for the inclusion of a ‘mix of measures’ and the ability to ‘review the targets and the different elements contributing to those targets’ over time (House of Commons, 1997a: 6, 16, 17). The British thus brought to the negotiations a preference for policy adaptability and renegotiation, both key elements of flexibility.

From the beginning, the climate regime has contained basic protections to accommodate questions regarding the severity of the challenge and the costs of addressing it. Both the FCCC and the Kyoto Protocol contain provisions (Articles 25 and 27, respectively) that allow withdrawal with one year’s notice. In addition, Kyoto uses successive five-year commitment periods so states can renegotiate their emission reduction targets periodically in light of new science and changing political and technological circumstances. Article 9.1 of Kyoto mandates a review process so the treaty can be adjusted ‘in the light of the best available scientific information and assessments on climate

change and its impacts, as well as relevant technical, social and economic information.’ Every delegation proposal submitted during the AGBM process called for reviews based on the latest scientific knowledge (Depledge, 2000: 68), making this virtually the only treaty provision that received unanimous support. These review and renegotiation features are common mechanisms of transformative flexibility.

The climate regime has been designed to include another, more innovative, source of flexibility intended to deal with uncertainty regarding the distribution of impacts and benefits. The regime affords states an enormous degree of what I term *means flexibility*, or the ability to meet commitments in a variety of ways. As provided in Kyoto (i.e. the institutional outcome as of December 1997), Annex 1 states may meet targets through five categories of policy:

1. States may *cut emissions at home* through regulations or incentives that lower national emissions (Article 2).
2. States may *create carbon sinks* at home to effect net changes in their greenhouse gas emissions (Article 3.3).
3. States may engage in projects that *reduce emissions abroad* through the Clean Development Mechanism (CDM) or Joint Implementation (JI). Through JI (Article 6), Annex 1 states can accrue emissions credits by investing in projects that reduce emissions in other Annex 1 countries. The CDM (Article 12) allows similar activities in non-Annex 1 states.
4. States may *create sinks abroad* through JI by, for example, funding a reforestation project in another Annex 1 country. (Kyoto delegates left for future negotiations the question of whether sink projects would also be allowed under the CDM.)
5. States may buy credits from other Annex 1 countries through *emissions trading* (ET) (Article 17). The ability to buy credits to meet targets gives leaders an alternative to reducing emissions; the relative attractiveness of the two choices will vary as political and economic circumstances change.

As one environment official put it, governments have a ‘tool kit’ that can be drawn from as circumstances change.⁹ With greater means flexibility, states can adjust the portfolio of policies — and thus the qualitative nature of their commitment — in response to new and potentially unforeseen contingencies. These adaptive changes can be temporary or indefinite, and they can be pursued by individual states or by all parties, as required by circumstances.

The negotiations reveal that not all states were equally supportive of flexible design proposals. Within the rubric of domestic policies — options 1 and 2 — there was disagreement over the degree of flexibility that should be available to states. This was reflected in the debate over ‘policies and measures’ (PAMs). The EU argued throughout the AGBM process for the creation of a set of ‘mandatory and coordinated policies and measures’ to guide government policies (Depledge, 2000: 19). They submitted an early proposal to define mandatory PAMs common to all Annex 1 parties — something their preparatory documents describe as a ‘key element for inclusion in the protocol’ (Council of Ministers, 1995) — and later proposed a specific list (UN Doc. FCCC/AGBM/1997/3. Add.1: 22). While a few delegations agreed that some mandatory policies should be

listed in the treaty, the EU's insistence on mandatory and common PAMs met with resistance from most and 'exasperation' from the Chairman of the AGBM, who sensed how unpopular such rigidity was (Yamin, 2000: 52).

The United States warned against 'prematurely specifying individual policies and measures' (*ENB*, 7 November 1995: 3) and argued throughout the AGBM process for a non-mandatory and thus more flexible approach that was sensitive to different and changing national circumstances. Australia and the oil exporters were also opposed to the inclusion of mandatory means, and Canada and New Zealand both stated explicitly in their proposals that parties should retain flexibility in selecting PAMs (Depledge, 2000: 20; *ENB*, 7 November 1995: 3–4). As the negotiations proceeded, choices were repeatedly made to retain an expansive list of optional PAMs; mandatory language was deleted and references to specific policies or sectors were made more general. By the time the Chairman proposed his Negotiating Text for the Protocol in October 1997, he listed various policies that states should simply 'aim' to implement (Depledge, 2000: 21). In the end, eight categories of PAMs were listed in Article 2.1(a) of Kyoto but they are offered as examples, not as a mandatory list.

With regard to the international means, as early as COP 1 the United States was arguing that Annex 1 countries should be able to earn credits for projects implemented in developing countries, where smaller investments could produce greater benefits in terms of emissions reduction. At a meeting later that year, US delegates argued that 'activities implemented jointly' — the early phrase for what became JI and CDM — were key to the climate regime's continuing progress (*ENB*, 5 September 1995: 5). The British government had similarly advocated exploration into approaches involving joint action as a way to maintain flexibility (Department of the Environment, 1994: 68). In general, the JUSSCANNZ bloc (Japan, the US, Switzerland, Canada, Australia, Norway, and New Zealand) favored joint activities among all Kyoto parties, to begin as soon as possible and with no restrictions on how much of a commitment could be met in this manner. The inclusion of JI and CDM contributed directly to means flexibility. As one US negotiator attests, 'we pushed very hard for CDM and JI. We very much wanted these policy options available to increase our flexibility.'¹⁰

The G-77 and China repeatedly objected to the inclusion in Kyoto of any 'activities implemented jointly.' Other developing countries, notably Brazil, supported the use of projects in the developing world as a way to transfer technology but did not envision them as a path for Annex 1 countries to meet their commitments (UN Doc. FCCC/AGBM/1997/MISC.1/Add.3). The EU struck a middling position by insisting that credits gained from joint activities be 'supplemental to domestic policies and measures' as a way of ensuring that domestic emissions reduction remained central to the regime (Depledge, 2000: 62; European Communities, 1997: 6). Kyoto is vague on what became known as the 'supplementarity' issue, leaving states to fight this battle in the post-Kyoto years.

The idea of trading emissions credits came from the United States. According to one AGBM participant, the rationale offered by the United States in proposing ET was 'a flexibility argument intertwined with a costs argument.'¹¹ The concept of trading was supported by several influential states, including other members of JUSSCANNZ, who saw ET as a vital flexibility antidote to the imposition of binding emissions commitments. Most European negotiators, by contrast, were skeptical of the trading approach.¹²

As with JI and CDM, the EU proposed that emissions trading should be ‘supplemental to domestic action,’ which should provide the ‘main means’ of meeting commitments (Depledge, 2000: 83). The ‘supplemental’ language made its way into the final Kyoto text; the reference to ‘main means,’ with its more specific implication, was eliminated as the drafts evolved.

In sum, the process of negotiating Kyoto reveals strong evidence for Observable Implications 1, 2, 4, and 5. There is only mixed support for Implication 3 since some states, notably the EU and developing countries, systematically objected to the *extent* of flexibility favored by most Annex 1 states, though they did not object to them altogether. Indeed, European policymakers view institutional flexibility as an important response to the uncertainty in climate and adjustments are a key part of the EU’s internal climate program. As one EU official notes, ‘We still look for more science and better policy options over time, and we fine-tune our policy as new science comes in. [Kyoto] allows us to do that.’¹³ In explaining the Kyoto outcome, the uncertainty–flexibility rational design hypothesis performs quite well.

Alternative motivations

The alternative explanations, based on power and compliance costs, help explain additional aspects of treaty design but do not account for the flexibility outcome. On a basic level, relative power may help us understand why the United States got most of what it wanted during the negotiations, while in most instances, according to a German diplomat, developing countries were mere ‘bystanders’ (Ott, 2001: 283). On closer inspection, however, these weaker states played a secondary role only once it became clear, at COP 2, that they would not assume any binding emissions reduction commitments.¹⁴ At that point they had achieved their main goal and were relatively satisfied. Moreover, the EU, arguably the second-most powerful actor in the climate negotiations, made repeated compromises in terms of the extent of flexibility and targets. The causal relationship between power and outcomes is not at all straightforward.

Without question, concerns over implementation costs were an overriding concern for most delegations, and one motivation for flexibility was indeed to bring down the overall costs of achieving emissions reduction targets. But cost motivations do not explain important aspects of state behavior and institutional outcomes during the Kyoto phase. First, many Annex 1 countries accepted deep cuts in emissions despite serious concerns over costs. Canada, for example, agreed to reduce emissions to 6 percent below their 1990 level despite anticipation of a large increase in emissions under the ‘business-as-usual’ scenario, high emissions per capita, and a fairly energyintensive economy (Cooper et al., 1999). The same could be said of the United States, which agreed to a 7 percent reduction. Second, the EU accepted the most stringent target (an 8 percent reduction) and at the same time argued for limiting the use of sinks and emissions trading, despite projections at the time that meeting targets through domestic abatement alone would be much more expensive (Ellerman and Wing, 2000). An examination of European Parliament debates before and after Kyoto was signed shows that most members were dismayed that the Commission did not agree to *deeper* cuts for Europe (European Communities, 1998: 70, 73).

Finally, those governments facing the most constraining targets often spoke of reducing emissions as a matter of *principle* and as a collective good, rather than in narrower cost–benefit terms. Questioned aggressively about the costs of Kyoto by Members of Parliament, Canadian Prime Minister Jean Chrétien responded dismissively, arguing that ‘We have an obligation to ensure that the globe survives this crisis’ (Parliament of Canada, 1997a). The Deputy Prime Minister of Canada added: ‘It is a deal that is good for the world’ (Parliament of Canada, 1997b). A British government report issued two months prior to the Kyoto meeting argued that developed countries had a ‘moral obligation to take the lead in reducing emissions’ (Department for the Environment, Transport and the Regions, 1997). A German member of the European Parliament made a similar argument two weeks before the Kyoto meeting: ‘It is our duty to provide an example,’ he proclaimed (European Communities, 1997: 12). These actions and rhetoric demonstrate that key governments were not consistently seeking to minimize their compliance costs or to emerge as distributive winners during the process of negotiating the Kyoto Protocol.

The post-Kyoto negotiations: Shifting motivations

While the Kyoto Protocol provided a basic framework, significant unfinished business remained in terms of fleshing out the rules and how they would be implemented. These issues, which had important implications for institutional flexibility, were taken up at COP 6 in The Hague, COP 6.5 in Bonn, and COP 7 in Marrakesh.

Uncertainty was still an abiding concern for negotiators and their governments after 1997, though uncertainty over the science of global warming was less important than uncertainty over impacts and policy alternatives. On the best way to approach climate policy post-Kyoto, the European Commission noted that ‘there is still a lot of uncertainty which must be clarified’ (European Communities, 1998: 69). The Chairman of the UK’s Royal Commission on Environmental Policy testified to the House of Commons that, especially at the regional level, there ‘is still a great deal of uncertainty about the assessment of climate’ (House of Commons, 1997b).

However, while many states continued to pursue flexibility — indeed, they did so with renewed vigor — the motivations behind the call for flexibility changed from the pre-Kyoto years. In particular, the competitiveness implications of variation in compliance costs drove certain states to drive a harder bargain and to push the regime in a direction that was both shallower overall and more favorable for them. With these distributive motivations at the fore, the role of power grew increasingly important in the negotiations. Thus while uncertainty was still a concern, it was no longer the prime driver of institutional flexibility.

Enhancing flexibility

After Kyoto, debate centered on two unresolved issues: the extent of allowable sink use and supplementarity, that is, the extent to which the international mechanisms (JI, CDM, and ET) could be used. For the most part, these issues pitted the EU against the more pro-flexibility United States and Umbrella Group, a post-Kyoto bloc usually comprising the US, Canada, Australia, Japan, Iceland, Norway, New Zealand, Russia, and the Ukraine.

These delegations argued that states should be free to take advantage of the flexibility and cost-savings made possible by the mechanisms and sinks. With fewer restrictions, the portfolio of policy means could also be adjusted over time to accommodate new information and political demands. The EU and some developing countries argued against unfettered use of the mechanisms and sinks partly as a matter of principle; they did not want the regime to confer a 'right' to emit. The Europeans had material considerations as well: they lacked expanses of forest and farmland (i.e. potential sinks) and, as leaders in alternative energy, they were in a comparatively good position to reduce emissions at home.

The impasse over sinks and mechanisms was a chief cause of the failure of the COP 6 meetings in The Hague in 2000. The EU did not back down in the face of a united front presented by the US, Canada, Japan, and Russia, who pushed for the inclusion of additional sink activities (a possibility raised in Article 3.4 of Kyoto), the ability to use sinks as part of the CDM (the EU preferred that CDM be reserved for emissions abatement programs), and unlimited rights to trade and otherwise use the international mechanisms. The EU rejected these proposals and continued to stress domestic actions as the primary means for fulfilling commitments (*ENB*, 14 November 2000: 2).

When talks resumed in Bonn and Marrakesh, the Europeans faced enormous pressure to compromise — especially since the future of Kyoto was in doubt following the Bush administration's withdrawal in early 2001. The EU, supported by the G-77, proposed a ceiling of 50 percent on how much of a state's emissions target could be met through the mechanisms. But the imposition of any quantitative ceiling was opposed by the United States and the Umbrella Group (*ENB*, 13 November 2000: 3) and in the end the use of mechanisms was left unlimited. The Bonn and Marrakesh agreements require only that domestic action constitute a 'significant element' of national policy. Not only is this wording vague, it is offset by other language that requires domestic action 'in accordance with national circumstances' — a formulation that could be used to justify little or no domestic effort (Vespa, 2002: 408).

The Umbrella Group pushed for rules to count carbon sinks more liberally and to allow sinks to account for a larger percentage of emissions reduction efforts. Thus in Bonn, as a result of a proposal by the United States, Canada, and Japan, *forest management* practices that enhance the carbon sequestration of existing forests were added to afforestation and reforestation as sources of sink credits, despite objections from the EU, China, and many developing countries (*ENB*, 27 November 2000: 10–11). By the time of the Marrakesh Accords, *cropland management*, *grazing land management*, and *revegetation* had been added to the list of eligible sink activities. These expanded sink-based measures substantially increased the policy options available to governments (see, e.g. Government of Canada, 2002).

In Bonn some members of the Umbrella Group suggested for the first time that CO₂ absorbed by the newly included category of forest management practices be counted toward Annex 1 obligations in the first commitment period. The EU and most developing countries objected since this would constitute an indirect renegotiation of the Kyoto targets (*ENB*, 30 July 2001: 7). The parties compromised by agreeing to set caps on the amount of credit that could be accrued in this way. Ostensibly, these caps were decided based on a formula that took into account objective criteria and varying national circumstances, but in fact the process was opaque and politicized (Amano and Sedjo, 2003: 3).

Japan, Canada, and Russia used their leverage to negotiate caps in the amounts of 12 million, 13 million, and 17.6 million metric tons of carbon per year, respectively. Though the issue was seemingly settled, in Marrakesh Russia used explicit threats not to ratify to demand an even higher allowance and had its cap almost doubled, to 33 million tons (FCCC, 2002: 64). By contrast, most caps were set at less than a million tons (after Russia, Japan, and Canada, the fourth largest cap, granted to Germany, was 1.24 million).

The result of the sink negotiations at COP 6 and 7 was to effectively reduce emissions reduction targets from an average of 5.2 percent below 1990 levels to about 2 percent. One delegate describes the allowances granted to Canada, Japan, and Russia as 'sink loopholes.'¹⁵ For those countries, these generous sink allowances, combined with carbon trading, will dramatically reduce the costs of compliance (Böhringer and Vogt, 2003). The Umbrella Group also succeeded in their effort to include sink-based projects in the CDM.

In sum, the Bonn and Marrakesh agreements clearly enhance the regime's flexibility: they contain no defined limits on the use of international mechanisms — trading and activities implemented jointly — and they substantially expand the use of sinks. Coupled with the continued concerns over uncertainty, the result is evidence consistent with Observable Implications 1 and 5: the independent variable is present and the predicted institutional outcome is observed. We must now consider the more important question of the causal link.

Efficient flexibility? The role of costs and power

It is clear from the negotiations and underlying policy debates that the post-Kyoto drive for flexibility on the part of certain states was motivated only partly by concerns over uncertainty and efficiency, as rational design theory implies. Instead, key governments sought a more *shallow* and favorable treaty that would reduce their compliance costs, and they used arguments for flexibility to achieve this. And when governments with lower compliance costs — namely, those in the EU — resisted the move toward easier targets, the institutional outcome was determined by relative bargaining power. Thus the alternative explanations account for flexibility better than the main hypothesis for the post-Kyoto phase of the climate regime.

A confluence of circumstances served to heighten concerns over compliance costs in the years following Kyoto. First, the reality of implementing laws and policies to reach Kyoto targets began to set in, while at the same time a series of studies presented a clearer picture of the costs of compliance — and how they varied across countries. Among the major emitters we see significantly higher compliance costs for the United States, Canada, and Japan, and lower costs for most European countries. The former have higher emissions per capita, rely heavily on coal for energy, and have steeper emissions projections in the baseline case (Cooper et al., 1999). In the late 1990s and early 2000s, the United States and Japan both faced rapidly rising CO₂ emission growth, while countries like France, Germany, and the UK had seen little or no growth in emissions leading up to Kyoto and faced lower projected growth moving forward. While the carbon intensity of the Japanese and American economies was growing, making targets harder to reach with the passage of time, the opposite was true in much of the EU (Viguier et al., 2002).

Second, as countries ratified Kyoto they faced the competitiveness concerns that arise from knowing that economic competitors are not saddled with emissions regulations. The soaring economies of India and China — which, as developing countries, did not assume commitments — posed a perceived threat, as did the United States. While US ratification was always in doubt, its non-participation became a certainty in March 2001 when Bush promised not to submit Kyoto to the Senate. This move cast a profound shadow over COP 6.5 and COP 7, which took place later that year. In Canada, government officials and business lobbies worried about competing with American companies unrestrained by Kyoto rules (IISD, 2005).¹⁶ The governments of Australia and Russia made similar arguments to explain concerns over compliance costs and to justify delayed ratification (Thompson, 2006: 13–14).

Especially from the time of US withdrawal, the extent and nature of arguments for flexibility made by COP delegations map very closely onto their actual and perceived compliance difficulties. Russia's situation was unique. For a few years after Kyoto, the compliance picture looked very positive for Russia, which had surpassed its target and was accruing carbon credits simply as a result of economic stagnation. This Russian 'hot air,' as it came to be known, acquired through no effort or policy change, was potentially lucrative since it could be sold through emissions trading. However, with US withdrawal much of the anticipated demand for carbon disappeared and the price sank accordingly; suddenly Russia faced much higher compliance costs (Manne and Richels, 2003). The result was a renewed push for flexibility through sinks, trading, and joint implementation at Bonn and Marrakesh.

Two additional issues must be considered to understand variable compliance costs and the distributive implications of Kyoto. First, Europeans typically have a precautionary attitude toward the environment, including climate change (Sunstein, 2003), and thus the political costs of proactive and costly measures are lower for their governments. Other publics are simply more reluctant to make sacrifices. For example, 59 percent of Americans and 43 percent of Russians feel it is 'necessary to take major steps very soon' to address climate change, compared to 91 percent in Spain, 86 percent in Italy, 85 percent in France, and 70 percent in the UK (BBC World Service, 2007: 10). Second, the perceived consequences of *inaction* on climate change produce differential compliance costs. A series of analyses conducted in the years following Kyoto demonstrates that sectors and regions will be impacted quite differently by climate change. Among the Annex 1 countries, an interesting pattern emerges: OECD Europe faces a much higher risk than North America, Japan, and Russia (Mendelsohn et al., 2000; Nordhaus and Boyer, 2000; Tol, 2002). In this respect, the relative compliance costs are higher for these countries precisely because the costs of inaction are lower; for Europe, the benefits of taking decisive action are greater.

The outcome of Bonn and Marrakesh, codifying the unlimited use of flexibility mechanisms and relaxing the overall effective limits on emissions, clearly diverged from the EU's preferred design. Why would such a large and influential actor fail so utterly to impose its preferences? The answer is found in the key intervening variable of bargaining power. The EU suffered from a disadvantage in three respects. First, it had staked its ability to function as an international actor on the success of climate negotiations and thus a successful conclusion at COP 6 and 7 became a test of EU leadership (Gupta and Grubb, 2000). Second,

the EU's eagerness to sign and ratify Kyoto, and its very public acknowledgment that it would have been willing to accept an even tougher target, left its negotiators with little leverage during the years between the signing of Kyoto and its entry into force. More reluctant governments were able to point to domestic constraints, a hands-tying effect that increased their bargaining leverage (Putnam, 1988; Slapin, 2006).

Third and finally, any hope the EU had of avoiding a more flexible and shallow outcome faded with US withdrawal in 2001. Because the United States accounted for 36 percent of Annex 1 emissions, the participation of the remaining large emitters — especially Canada, Japan, and Russia — became more crucial than ever for achieving the 55 percent threshold for entry into force. Assessing the results of Marrakesh, a European Parliament report explains that, 'The EU had to pay the price of its desire to ensure an agreement at all costs by making a number of concessions' (European Parliament, 2002: 7).

Discussion: Refining rational design theory

The examination of climate change institutions and negotiations sheds light on a fundamental prediction of rational design theory, that uncertainty leads actors to create flexible institutions. If we treat Kyoto as the institutional outcome, the rational design hypothesis performs quite well: actors sought flexibility largely as a means to accommodate uncertainty and the institutional outcome reflects this desire. The post-Kyoto changes, however, provide less support and demonstrate how misleading an exclusive focus on outcomes can be. While flexibility was indeed enhanced, it was the product mostly of variable compliance costs and distributive concerns, with the outcome mediated through the relative bargaining power of actors. These findings have broader implications for the rational design project.

Uncertainty and flexibility: Improving our understanding

Regarding the independent variable, the politicization of uncertainty in the climate case suggests that it can be subject to manipulation during negotiations. It is not an entirely exogenous variable. More generally, state leaders may express a concern over certain barriers to cooperation as a strategy to undermine negotiations or to drive institutional design in a certain direction, and thus various empirical sources must be consulted to identify the true role of a given factor and how it translates into institutional outcomes.

Turning to the dependent variable, flexibility in this regime came primarily through *means flexibility*, a source not considered in the literature. Means flexibility allows for a variety of policies — each representing a set of tradeoffs and distributive implications — to meet commitments. Though it is primarily a tool of adaptive flexibility (it allows individual actors to adjust their behavior), it also performs functions of transformative flexibility insofar as all actors may choose to adjust their policies in similar directions in response to new information, effectively changing the agreement itself by altering the nature of compliant behavior. Means flexibility is a robust solution to uncertainty problems and may serve as a substitute for the literature's 'usual suspects' of renegotiation and escape.

More generally, rational design theorists interested in the uncertainty– flexibility nexus should further disaggregate both variables and strive to map different types of

uncertainty onto different types of flexibility. The climate case suggests at least one possibility along these lines. Over time, the nature of the problem changed from more *general uncertainty* that affected all actors (basic scientific questions about the sources and importance of climate change) to more *particularistic uncertainty* that affected some actors more than others (questions regarding precise impacts and policy alternatives), with the latter presenting more immediate distributive consequences for policy-makers. The institution was adjusted accordingly, with Kyoto employing transformative flexibility in the form of renegotiation provisions and the post-Kyoto agreements emphasizing adaptive flexibility in the form of a diverse policy tool kit that could be manipulated to address new distributive demands.

This suggests the following proposition: *actors faced with general uncertainty have incentives to create institutions with transformative flexibility, while those faced with particularistic uncertainty have incentives to create institutions with adaptive flexibility.* Figure 1 presents the logic graphically. If this is true, across institutions we should find that issues characterized by general uncertainty are associated with transformative flexibility, while those characterized by particularistic uncertainty are associated with adaptive flexibility. A second implication is that changes over time in the nature of uncertainty in a given issue-area should produce changes in the nature of flexibility sought by institutional members.

Intervening and omitted variables

Rational design theory has little to say about how divergent preferences translate into institutional outcomes. The role of relative bargaining power helps fill this gap. During the Kyoto negotiations, bargaining power derived largely from a state’s share of global

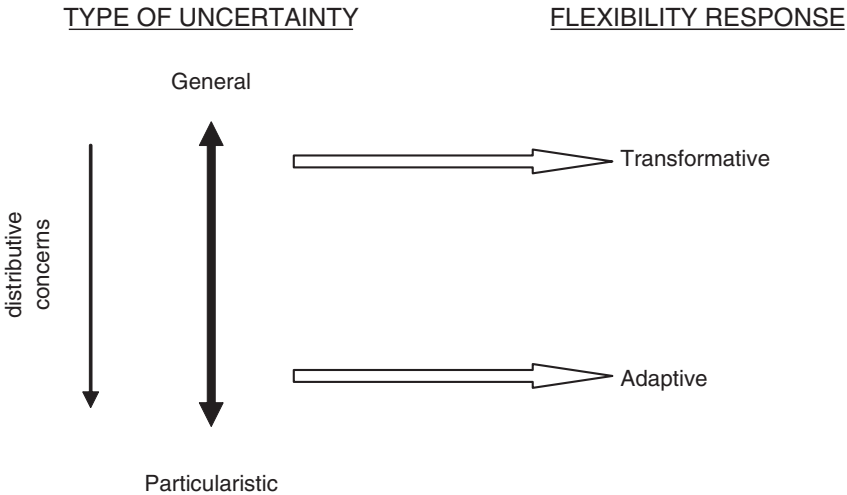


Figure 1. Sources of uncertainty and flexibility responses

emissions, rendering the US highly influential. After Kyoto was completed and was awaiting sufficient ratifications, the strategic dynamics changed: holdouts like Australia, Canada, Japan, and Russia gained disproportionate influence and imposed new negotiating demands. Facing fewer domestic constraints and having staked its reputation on success, the EU was forced to make concessions.

The lesson for models of rational design is that bargaining power represents an important intervening variable. Consistent with the negotiations literature, bargaining power in the climate case derived from asymmetries among actors over the value placed on a cooperative outcome and on the consequences of stalemate (Odell, 2000: 27). Because they are not obvious and may change over time, one must delve into the details of institutional choice to uncover the sources of bargaining power in particular issues and at particular junctures in the negotiating process.

A final implication for the rational design literature is that institutional design features are not always chosen for the reasons identified in a given model. An outcome-based research design gives us no insight into *why* certain features are chosen and can generate misleading conclusions when the outcome results from omitted variables — especially when such variables are systematically correlated with the hypothesized independent variable.

Observing these motivations and choices requires careful analysis of institutional creation. In the climate regime, some treaty provisions that provide collectively efficient flexibility also lower the costs of compliance for some states more than others, making it difficult to know if these features reflect that logic of flexibility or of shallowness. During the post-Kyoto phase of negotiations, in particular, selfish proposals for weakening commitments were often couched in terms of a need for Pareto-efficient flexibility. When design solutions overlap in this way, a deeper investigation of the causal link between cooperation problems and design outcomes is critical.

Conclusion

The rational institutional design literature in IR has produced important insights regarding how international institutions are designed and why they vary in systematic ways. As this literature has advanced theoretically, reflected for example in more sophisticated formal models, empirical efforts have lagged. Continued reliance on research designs — both qualitative and quantitative — that examine institutional outcomes will not be sufficient to close this gap. Using a study of the climate regime negotiations, this article offers an assessment of a central rational design hypothesis, that uncertainty leads actors to create flexible institutions. I find support for the hypothesis in the form of an intermediate institutional outcome, the 1997 Kyoto Protocol, that is consistent with the model's prediction and a negotiating process that partially conforms to an efficiency perspective on design.

However, rational design theory as typically conceived is unable to explain important aspects of the case. The negotiations show that not all countries supported the same degree of flexibility, and some resisted flexibility altogether. This variegated behavior is difficult to explain with models in which generic states confronted with the same barriers to cooperation should theoretically seek similar institutional solutions. Moreover,

distributive concerns over compliance costs and the relative bargaining power of states helped determine the institutional outcome, including the nature and degree of flexibility, especially during the post-Kyoto phase of negotiations. None of these factors can be understood if we focus on institutional outcomes as our primary evidence.

The case also shows that support for a given hypothesis may depend on what institutional state we treat as the relevant outcome. The point at which we choose to take our institutional 'snapshot' (Pierson, 2004) is a consequential choice that is often arbitrary in practice. Taking multiple snapshots is one partial solution to this problem and also allows us to more easily measure changes in the relevant independent and dependent variables.

Many important observable implications of a rational choice argument on institutional design can only be assessed through in-depth analysis of institutional creation and modification to see whether actor behavior is consistent with rational choice predictions. This is not merely a call for the inductive study of negotiations, which by itself has limited theoretical value (Moravcsik, 1999). Rational design theory provides a set of rigorous propositions that can help structure the empirical analysis of negotiations to serve more general theoretical ends. Ultimately, empirical work should proceed on two fronts: large-*n* analysis to establish correlations with confidence, and qualitative analysis to establish the mechanisms underlying institutional design outcomes. Only with an eclectic approach to research can we explore the full range of implications — varied and sometimes quite subtle — of rational choice arguments on institutions (Pahre, 2005; Shepsle, 1995).

An important lesson is that rational choice institutionalists should relax their focus on institutions as static outcomes that spring forth from given strategic settings. Viewing institutions as the result of processes that occur over time is entirely compatible with the view of institutions as equilibria (Greif and Laitin, 2004). When taken most seriously, rational choice theory speaks not only to institutional outcomes but also to the choices and strategic interaction — the processes — that lead to such outcomes.

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Notes

1. Recent empirical evidence shows that flexibility can indeed increase participation in international institutions (Kucik and Reinhardt, 2008; von Stein, 2008).
2. Partial exceptions in the volume are Oatley (2001) and Richards (2001). Elsewhere in the literature, Koremenos (2001), Eilstrup-Sangiovanni and Verdier (2005), and Lake (1999) devote attention to tracing the history of policy debates and negotiations that lead to institutional outcomes.
3. On 'process tracing' more generally, see George and Bennett (2005: ch. 10).

4. Of course, rationalist arguments on institutions can also be tested against non-rationalist competitors, as others have done (Hawkins, 2004; McNamara, 2002).
5. These are available online at http://www.iisd.ca/process/climate_atm.htm. The climate negotiations constitute Volume 12 of the *ENB*.
6. These interviews are cited with varying degrees of anonymity in accordance with the interviewees' wishes. Some were conducted on a 'background' basis and are thus not reflected in the footnotes.
7. Author interview with Lars-Olof Hollner, Head of Transport, Environment and Energy, Delegation of the European Commission, Washington, DC, 6 November 2003.
8. Author interview with a US EPA official and member of several US COP delegations, Washington, DC, 7 November 2003.
9. Author interview with Robert Donkers, Environment Counselor, European Commission Delegation, Washington, DC, 6 November 2003.
10. Author interview with a US EPA official and member of several US COP delegations, Washington, DC, 7 November 2003.
11. Author interview with an OECD official, Paris, France, 1 October 2004.
12. Author interview with an OECD official, Paris, France, 1 October 2004.
13. Author interview with Lars-Olof Hollner, Head of Transport, Environment, and Energy, Delegation of the European Commission, Washington, DC, 6 November 2003.
14. As one US official notes, 'there was no reason for them to make a fuss when they weren't being asked to do anything.' Author's correspondence with a former White House environment advisor involved in climate negotiations, 25 April 2005.
15. Author interview with a US EPA official and member of several US COP delegations, Washington, DC, 7 November 2003.
16. Author interview with an official from Canada's Department of Foreign Affairs and International Trade, Washington, DC, 6 November 2003.

References

- Abbott K, Snidal D (2000) Hard and soft law in international governance. *International Organization* 54(3): 421–456.
- Aldy JE, Stavins RN (eds) (2010) *Post-Kyoto International Climate Policy*. New York: Cambridge University Press.
- Amano M, Sedjo R (2003) Forest Carbon Sinks: European Union, Japanese, and Canadian Approaches. Discussion Paper 03–41. Washington, DC: Resources for the Future.
- Baird DG (1990) Self-interest and cooperation in long term contracts. *Journal of Legal Studies* 19: 583–596.
- Bates R, Greif A, Levi M, Rosenthal J-L, and Weingast BR (1998) *Analytic Narratives*. Princeton, NJ: Princeton University Press.
- BBC World Service (2007) All Countries Need to Take Major Steps on Climate Change: Global Poll. 25 September. Available at: www.globescan.com/news_archives/bbc_climate/bbcclimate.pdf
- Böhringer C, Vogt C (2003) Economic and environmental impacts of the Kyoto protocol. *Canadian Journal of Economics* 36(2): 475–494.
- Cooper A, Livermore S, Rossi V, Wilson A, and Walker J (1999) The economic implications of reducing carbon emissions. *The Energy Journal*, Kyoto Special Issue (December): 335–365.

- Corfee-Morlot J, Agrawala S (2004) The benefits of climate policy. *Global Environmental Change* 14: 197–199.
- Council of Ministers (1995) Press Release 70, No. 5424/95, 3 September. Department of the Environment (1994) Climate Change: The UK Programme. Cm 2427, January, London.
- Department for the Environment, Transport and the Regions (1997) Memorandum on the Special Session of the UN General Assembly to Review Progress since the Rio Earth Summit, October.
- Depledge J (2000) Tracing the Origins of the Kyoto Protocol: An Article-by-Article Textual History. Technical Paper, UN FCCC/TP/2000/2.
- Diermeier D, Krehbiel K (2003) Institutionalism as a methodology. *Journal of Theoretical Politics* 15: 123–144.
- Dowlatabadi H (2003) What do we Know about Climate Policy Costs and how can we Learn More? OECD Workshop Paper, ENV/EPOC/GSP(2003)11/FINAL.
- Downs GW, Rocke DM (1995) *Optimal Imperfection? Domestic Uncertainty and Institutions in International Relations*. Princeton, NJ: Princeton University Press.
- Downs GW, Rocke DM, and Barsoom PN (1996) Is the good news about compliance good news about cooperation? *International Organization* 50: 379–406.
- Duffield J (2002) The limits of ‘rational design’. *International Organization* 57: 411–430.
- Edmonds JA, Sands RD (2003) What are the costs of limiting CO₂ concentrations? In: Griffin JM (ed.) *Global Climate Change: The Science, Economics, and Politics*. Cheltenham: Edward Elgar, 140–186.
- Eilstrup-Sangiovanni M, Verdier D (2005) European integration as a solution to war. *European Journal of International Relations* 11(1): 99–135.
- Ellerman AD, Wing IS (2000) Supplementarity: An invitation to monopsony? *The Energy Journal* 21(4): 29–59.
- Elster J (2000) Rational choice history: A case of excessive ambition. *American Political Science Review* 94(3): 685–695.
- Environment Canada (1997) Canada’s Energy and Environment Ministers Agree to Work Together to Reduce Greenhouse Gas Emissions. News Release, 12 November.
- European Communities (1997) Report of Proceedings from 17 to 21 November 1997. *Official Journal of the European Communities Debates of the European Parliament* 4: 509.
- European Communities (1998) Report of Proceedings from 16 to 20 February 1998. *Official Journal of the European Communities: Debates of the European Parliament* 4: 514.
- European Parliament (2002) Report on the Proposal for a Council Decision Concerning the Conclusion, on Behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on *Climate Change and the Joint Fulfilment of Commitments Thereunder*, 24 January, Final A5–0025/2002.
- FCCC (2002) Report of the *Conference of the Parties on its Seventh Session*, Held at Marrakesh from 29 October to 10 November 2001. FCCC/CP/2001/12/ Add.1.
- George A, Bennett A (2005) *Case Studies and Theory Development in the Social Sciences*. Cambridge, MA: MIT Press.
- Goldstein J, Kahler M, Keohane R, and Slaughter A-M (eds) (2001) *Legalization and World Politics*. Cambridge, MA: MIT Press.
- Government of Canada (2002) Forests and Agriculture Carbon Sinks and the Kyoto Protocol. Available at: www.climatechange.gc.ca/cop/cop6_hague/english/forests_e.html.

- Greif A, Laitin D (2004) A theory of endogenous institutional change. *American Political Science Review* 98(4): 633–652.
- Gupta J, Grubb M (eds) (2000) *Climate Change and European Leadership: A Sustainable Role for Europe?* Boston, MA: Kluwer Academic.
- Haftel YZ, Thompson A (2006) The independence of international organizations: Concept and applications. *Journal of Conflict Resolution* 50(2): 253–275.
- Harris M, Holmstrom B (1987) On the duration of agreements. *International Economic Review* 28(2): 389–406.
- Hawkins D (2004) Explaining costly international institutions: Persuasion and enforceable human rights norms. *International Studies Quarterly* 48(4): 779–804.
- House of Commons (1997a) Environment, Transport and Regional Affairs Committee. Climate Change, Minutes of Evidence, 29 October 1997, HC287-i.
- House of Commons (1997b) Environment, Transport and Regional Affairs Committee. Climate Change, Minutes of Evidence, 19 November 1997, HC287-ii.
- IISD (2005) Climate Change and Competitiveness: A Survey of the Issues, Background Paper, 30 March. Winnipeg: International Institute for Sustainable Development.
- IMF (2008) *World Economic Outlook*. Washington, DC: International Monetary Fund.
- IPCC (2007) *Climate Change 2007: Impacts, Adaptation and Vulnerability*. New York: Cambridge University Press.
- Kahler M, Lake DA (2003) Globalization and governance. In: Kahler M, Lake DA (eds) *Governance in a Global Economy*. Princeton, NJ: Princeton University Press, 1–30.
- Koremenos B (2001) Loosening the ties that bind: A learning model of agreement flexibility. *International Organization* 55(2): 289–325.
- Koremenos B (2005) Contracting around international uncertainty. *American Political Science Review* 99(4): 549–565.
- Koremenos B, Lipson C, and Snidal D (2001a) The rational design of international institutions. *International Organization* 55(4): 761–799.
- Koremenos B, Lipson C, and Snidal D (2001b) Rational design: Looking back to move forward. *International Organization* 55(4): 1051–1082.
- Koremenos B, Lipson C, and Snidal D (eds) (2004) *The Rational Design of International Institutions*. Cambridge: Cambridge University Press.
- Krasner S (1991) Global communications and national power: Life on the Pareto Frontier. *World Politics* 43(2): 336–366.
- Kucik J, Reinhardt E (2008) Does flexibility promote cooperation? An application to the global trade regime. *International Organization* 62(3): 477–505.
- Lake D (1999) *Entangling Relations: American Foreign Policy in its Century*. Princeton, NJ: Princeton University Press.
- Lieberman ES (2005) Nested analysis as a mixed-method strategy for comparative research. *American Political Science Review* 99(3): 435–452.
- Lijphart A (1971) Comparative politics and the comparative method. *American Political Science Review* 65(3): 682–693.
- McNamara K (2002) Rational fictions: Central bank independence and the social logic of delegation. *West European Politics* 25(1): 47–76.
- Manne A, Richels R (2003) US rejection of the Kyoto Protocol: The impact on compliance costs and CO2 emissions. *Energy Policy* 32: 447–454.

- Mendelsohn R, Schlesinger M, and Williams L (2000) Comparing impacts across climate models. *Integrated Assessment* 1(March): 37–48.
- Moe T (2005) Power and political institutions. *Perspectives on Politics* 3(2): 214–233.
- Moravcsik A (1999) Theory and method in the study of international negotiation: A rejoinder to Oran Young. *International Organization* 53(4): 811–814.
- Morrow JD (2001) The institutional features of the prisoners of war treaties. *International Organization* 55(4): 971–992.
- Morton RB (1999) *Methods and Models*. New York: Cambridge University Press.
- Nordhaus WD, Boyer J (2000) *Warming the World: Economic Models of Global Warming*. Cambridge, MA: MIT Press.
- Oatley TH (2001) Multilateralizing trade and payments in postwar Europe. *International Organization* 55(4): 949–970.
- Odell J (2000) *Negotiating the World Economy*. Ithaca, NY: Cornell University Press.
- Office of Technology Assessment (1993) *Preparing for an Uncertain Climate: Summary*. Washington, DC: US Congress.
- OPEC (2000) OPEC Statement to the Conference of the Parties. The Hague, 13–14 November. Available at: www.opec.org/NewsInfo/COP_Statements/COP6_2000.htm.
- Ott HE (2001) Climate change: An important foreign policy issue. *International Affairs* 77(2): 277–296.
- Pahre R (2005) Formal theory and case-study methods in EU studies. *European Union Politics* 6(1): 113–146.
- Parliament of Canada (1997a) Edited Hansard, No. 47, 9 December, 36th Parliament, 1st Session.
- Parliament of Canada (1997b) Edited Hansard, No. 49, 11 December, 36th Parliament, 1st Session.
- Pierson P (2004) *Politics in Time: History, Institutions, and Social Analysis*. Princeton, NJ: Princeton University Press.
- Putman R (1988) Diplomacy and domestic politics: The logic of two-level games. *International Organization* 42(3): 427–460.
- Ragin CC (2004) Turning the tables: How case-oriented research challenges variable-oriented research. In: Brady H, Collier D (eds) *Rethinking Social Inquiry*. New York: Rowman and Littlefield, 123–138.
- Raustiala K (2005) Form and substance in international agreements. *American Journal of International Law* 99(2): 581–614.
- Richards JE (2001) Institutions for flying: How states built a market in international aviation services. *International Organization* 55(4): 993–1018.
- Rosendorff BP (2005) Stability and rigidity: Politics and design of the WTO's dispute settlement procedure. *American Political Science Review* 99(3): 389–399.
- Rosendorff BP, Milner HV (2001) The optimal design of international trade institutions: Uncertainty and escape. *International Organization* 55(4): 829–857.
- Schwartz W, Sykes A (2002) The economic structure of renegotiation and dispute resolution in the World Trade Organization. *Journal of Legal Studies* 31(1, Pt 2): 179–204.
- Shepsle KA (1995) Statistical philosophy and positive political theory. *Critical Review* 9: 213–222.
- Slapin JB (2006) Who is powerful? Examining preferences and testing sources of bargaining strength at European intergovernmental conferences. *European Union Politics* 7(1): 51–76.

- Smith, JM (2000) The politics of dispute settlement design: Explaining legalism in regional trade pacts. *International Organization* 54(1): 137–180.
- Stern N (2007) *The Economics of Climate Change*. Cambridge: Cambridge University Press.
- Sunstein CR (2003) Beyond the precautionary principle. *University of Pennsylvania Law Review* 151: 1003–1058.
- Thompson A (2006) Management under anarchy: The international politics of climate change. *Climatic Change* 78(1): 7–29.
- Tol RSJ (2002) Estimates of the damage costs of climate change. Part 1: Benchmark estimates. *Environmental and Resource Economics* 21(January): 47–73.
- Tol RSJ, Downing TE, Kuik OJ, and Smith JB (2003) Distributional Aspects of Climate Change Impacts. OECD Workshop on the Benefits of Climate Policy: Improving Information for Policy Makers. ENV/EPOC/GSP(2003)14/FINAL.
- US Global Change Research Program (1994) *Our Changing Planet: The FY 1994 US Global Change Research Program*. Washington, DC: National Science Foundation.
- Verdier D (2008) Multilateralism, bilateralism, and exclusion in the Nuclear Proliferation Regime. *International Organization* 62: 439–476.
- Vespa M (2002) Climate change 2001: Kyoto at Bonn and Marrakech. *Ecology Law Quarterly* 29(2): 395–420.
- Viguier LL, Babiker MH, and Reilly JM (2002) The costs of the Kyoto Protocol in the European Union. *Energy Policy* 31: 459–481.
- von Stein J (2008) The international law and politics of climate change: Ratification of the UN framework convention and the Kyoto Protocol. *Journal of Conflict Resolution* 52: 243–268.
- Wendt A (2001) Driving with the rearview mirror: On the rational science of institutional design. *International Organization* 55(4): 1019–1049.
- Williamson OE (1985) *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York: The Free Press.
- Yamin F (2000) The role of the EU in climate negotiations. In: Gupta J, Grubb M (eds) *Climate Change and European Leadership*. Boston, MA: Kluwer, 47–66.
- Yarbrough BV, Yarbrough RM (1992) *Cooperation and Governance in International Trade*. Princeton, NJ: Princeton University Press.

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