

# The International Law and Politics of Climate Change

## Ratification of the United Nations Framework Convention and the Kyoto Protocol

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A considerable challenge for the creators of international environmental agreements is how to design mechanisms that deter defection without deterring participation. Relatively “soft” law often garners widespread participation, but it creates few concrete incentives for states to improve behavior. “Harder” commitments make shirking more difficult, but these institutional features may deter from joining the very states whose practices are least consistent with the treaty’s requirements. Empirical analyses of ratification of the core agreements of the climate change regime support these propositions. Flexibility provisions provide one mechanism for states to mitigate this dilemma. The findings with regard to one flexibility mechanism strongly support this argument. The results with regard to a second flexibility mechanism, however, tend to follow an opposite pattern. The author offers a preliminary interpretation of this finding. Finally, this article provides insight into how international social networks and the strength of domestic nongovernmental organizations affect ratification.

**Keywords:** *climate change; international environmental cooperation; legalization and compliance; nongovernmental organizations; social networks*

During the past three decades, policymakers have faced increasing evidence that human behavior poses serious and potentially irreversible threats to the environment. Improved scientific research, the rise of environmental movements in many countries, and the realization that these problems rarely respect national borders have made environmental cooperation an increasingly important aspect of world

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politics. International environmental agreements have existed for at least 120 years, but they have increased substantially in number in recent decades (Environmental Treaties and Resource Indicators 2006). These agreements now cover a wide range of issue areas. They are increasingly dense in the sense that a given issue area may be governed by several agreements, which may be partially overlapping and non-hierarchical (Raustiala and Victor 2004).

This article examines when and why states ratify international environmental agreements, focusing on the two core treaties of the international climate change regime: the United Nations Framework Convention on Climate Change (FCCC) and the Kyoto Protocol.<sup>1</sup> I emphasize two important institutional characteristics: legalization and flexibility. With regard to legalization, I argue that there is an inherent trade-off in achieving participation (i.e., domestic ratification or its legal equivalent) in these agreements. Soft agreements such as nonbinding international statements of “principles, norms, and goals” (Porter and Brown 1996, 17) often achieve widespread participation, but they create few concrete incentives for states to improve their behavior. Hard commitments—characterized by precise, legally binding, commitments and (sometimes) external monitoring/enforcement—make shirking more difficult (Abbott and Snidal 2000). But these institutional features may deter from joining the very states whose environmental practices are least consistent with the treaty’s requirements. This matters for ratification. As legalization increases, states become more concerned about their ability subsequently to comply; the least compliant states may refrain from participating in agreements with high degrees of legalization altogether.<sup>2</sup> Empirical analyses of ratification of the FCCC and the Kyoto Protocol yield strong support for these propositions.

Flexibility provisions provide one way for states to mitigate this dilemma that legalization produces. Although much of the literature has focused on the role these mechanisms play in enabling states to create agreements (Koremenos 2001, 2005; Rosendorff and Milner 2001), they are also important for ratification. I argue that states’ ability to use these flexibility provisions increases their propensity to ratify, even if it does not fundamentally alter the relationships described in the previous paragraph. The empirical findings for one of the two flexibility mechanisms examined—carbon sinks—support this proposition. The results with regard to Activities Implemented Jointly(AIJ), somewhat surprisingly, tend to follow an opposite pattern. I offer some preliminary explanations for this finding.

My argument is largely one about how institutional characteristics affect ratification. Of course, numerous other factors drive participation as well. Along with other scholars (cf. Dorussen and Ward 2008 [this issue]; Hafner-Burton and Montgomery 2006, 2008 [this issue]; Hathaway 2007; Ingram, Robinson, and Busch 2005; Powell and Staton 2007; Raustiala 1997; Ward 2006), I recognize that social links between states and the strength of proratification nongovernmental organizations (NGOs) often affect ratification. I identify two such factors in the context of the international climate change regime: states’ centrality in the networks created

by international governmental organizations (IGOs) and the prevalence of domestic Greenpeace memberships. The analyses provide considerable evidence that these factors increase states' propensity to ratify the FCCC, but the results with regard to the Kyoto Protocol are substantially more mixed.

This article proceeds as follows. The second section provides a brief overview of the problem of climate change and the international institutional solutions states have created in an attempt to mitigate it. In the third section, I discuss the FCCC and the Kyoto Protocol as they relate to the literature on international legalization and institutional design and derive several hypotheses about how these factors affect states' ratification decision. The fourth section describes the data set on ratification of the FCCC and the Kyoto Protocol. In the fifth section, I present the statistical results. The final section provides conclusions.

### **Climate Change: Scientific and Historical Background**

The concentration of carbon dioxide (CO<sub>2</sub>), as well as other gases in the atmosphere, has increased dramatically since the second half of the nineteenth century (UN Environment Programme 1997). By the 1970s, scientists were increasingly concerned that higher concentrations of these gases were absorbing the earth's infrared radiation, creating a greenhouse effect. The earth's average surface temperature has risen by 0.6°C since the late 1800s (FCCC 2006), but—particularly until the late 1970s and the 1980s—there was substantial uncertainty about whether and how much human activities contributed to this increase. In 1979, the first World Climate Conference expressed concern that “continued expansion of man's activities on earth may cause significant extended regional and even global changes of climate” (Intergovernmental Panel on Climate Change [IPCC] 2005, 2). A 1985 conference reiterated this concern. In 1988, the IPCC was created; concurrently, several other national and international forums began to call for international cooperation on the issue.

After two years of preparation and negotiation, 154 states signed the FCCC at the UN Earth Conference on Environment and Development in June 1992. Within one and a half years, the requisite 50 states had ratified, and the convention entered into force in March 1994. For three principal reasons, the parties to the FCCC decided in 1995 to negotiate a protocol containing binding, quantified emissions reduction commitments for the industrialized countries. First, even during the FCCC negotiations, several European Community members had pushed for these commitments but were unable to convince the United States and the Union of Soviet Socialist Republics (USSR) to participate (Porter and Brown 1996, 95). Second, the IPCC's (1995) report established fairly definitively that human activities were significantly affecting the climate. Finally, there had been little concrete action to reduce greenhouse gas emissions since 1992 (Repetto 2001, 305). One hundred fifty-nine states signed the Protocol in Kyoto on December 11, 1997. Ratification proceeded considerably more slowly than was the case for the FCCC.

One hundred seventy-six UN members have now ratified, but the United States and Australia (whose combined greenhouse gas emissions constitute more than 26 percent of the world total)—have not ratified.<sup>3</sup> In February 2005, following Russia's pivotal ratification, the Kyoto Protocol entered into force.

### **Legalization and Flexibility: Implications for Ratification of the Framework Convention and the Kyoto Protocol**

Securing participation is a key challenge for supporters of international environmental agreements. Supporters care about ratification for a variety of reasons. Many of these agreements (including both the FCCC and the Kyoto Protocol) have substantial entry into force requirements. As a result, ratification delays in one state stall entry into force in other states. Supporters may view ratification as essential to improving states' environmental practices and/or to the perceived legitimacy of the effort. Patterns of ratification are also of interest to scholars of international cooperation, providing interesting insight into how states weigh the potential costs and benefits of participation. Moreover, as I have previously argued (von Stein 2005), understanding when and why states commit can offer important insight into when and why they subsequently comply.

My argument is fundamentally about how institutional characteristics affect ratification. I focus here on two perspectives that are particularly useful for understanding participation in the international climate regime: legalization and institutional flexibility. My aim is not to explain why states chose the particular institutional designs they did in 1992 and 1997.<sup>4</sup> Rather, I am interested in laying out a logic for how these factors affect the prospects of ratification and deriving testable hypotheses for the FCCC and the Kyoto Protocol.

#### **Legalization**

This section classifies the two key agreements of the climate change regime based on the components established in the legalization literature (Abbott et al. 2000) and then considers the implications of these design features for ratification. The FCCC can be classified as relatively soft for all parties. For the nonindustrialized countries, the Kyoto Protocol introduces no new commitments and so can be categorized as relatively soft. For the industrialized countries (listed in Annex 1 of the convention and in the appendix of this article available online<sup>5</sup>), in contrast, the Kyoto Protocol constitutes relatively hard law.

*Obligation.* All FCCC ratifiers assume two core obligations: to prepare national action plans for controlling emissions and to create national emissions inventories. Neither obligation requires improvements in states' emissions levels. The convention calls on the Annex 1 parties to take efforts to reduce greenhouse gas emissions "with

the aim of returning individually or jointly to their 1990 levels” (article 4, sec. 2). However—importantly—this commitment is not legally binding (Thompson 2005, 13). In sum, then, the FCCC seeks to “establish a set of principles, norms, and goals . . . for cooperation on the issue . . . rather than to impose major binding obligations” (Porter and Brown 1996, 17). The Kyoto Protocol, in contrast, incorporates a legally binding commitment among Annex 1 countries to fix greenhouse gas emissions at a set percentage of base year emissions.

The higher degree of legal obligation in the Kyoto Protocol for Annex 1 parties is likely to increase the probability of enforcement and detection of violations in two ways. First, states often inscribe hard obligations in domestic law, which then subjects them to domestic legal monitoring and enforcement. For instance, to my knowledge, the United States passed no implementing legislation with regard to article 4, section 2 of the FCCC. There is little doubt, on the other hand, that if the United States ratified the Kyoto Protocol, it would be necessary for Congress to pass legislation implementing the emissions targets (Claussen 1999). Second, some have argued that it may be more difficult for states to renege on agreements they have cast as legally binding because (1) they recognize a stronger obligation, under the principle of *pacta sunt servanda*, to abide (Abbott et al. 2000, 409), and/or (2) the reputational costs of violating hard law may be higher than the reputational costs of violating soft law (Abbott and Snidal 2000, 427).<sup>6</sup>

*Precision.* The FCCC (article 2) states its goal clearly: to “achieve . . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” In general, however, the agreement is fairly imprecise. It does not specify quantified emissions targets. In contrast, the Kyoto Protocol is a substantially harder agreement—for the Annex 1 parties. It specifies quantified emissions targets (inscribed in Annex B of the protocol and in the appendix of this article) that the Annex 1 parties agree to reach by the first commitment period 2008–12. According to Chayes and Chayes (1993), greater precision decreases the likelihood of unintended violations that result from treaty ambiguities. In addition, other states and actors such as IGOs and NGOs have a better metric for gauging noncompliance, which may enhance their ability to detect violations. Greater precision can also raise the costs of renegeing by fixing concrete consequences for legal violations.

*Delegation.* The FCCC entrusts some authority to third parties, and I therefore classify it as a case of moderate delegation. It creates a Conference of the Parties, charged with reviewing national communications and emissions inventories (FCCC 2006). This body is composed of member states’ representatives; the FCCC further limits the degree of delegation by stating that it will agree on and adopt—*by consensus*—its rules of procedure. The Kyoto Protocol creates no new bodies, but it delegates to the Conference of the Parties and its subsidiary bodies two important

tasks: (1) monitoring Annex 1 parties' implementation and compliance, and (2) overseeing implementation of the protocol's flexibility provisions. Delegation in the Kyoto Protocol therefore primarily concerns monitoring, rather than enforcement. This is nonetheless important: as Abbott and Snidal (2000) maintain, delegation of monitoring powers makes it more difficult for states to interpret the agreement in a self-serving or biased manner.

Legalization and compliance matter for ratification. Indeed, I argue, there is an inherent trade-off in achieving participation in international environmental agreements. Leaders considering ratification of relatively soft agreements will commit with little regard for how well behavior conforms to the terms of the treaty.<sup>7</sup> The reason, as discussed earlier, is that soft law generally lacks the means to compel substantial changes in state practice.<sup>8</sup> This has led some scholars to conclude that hard law, by virtue of the fact that it is legally binding and more difficult for states to escape once they have committed, provides the more effective means of eliciting change.<sup>9</sup> But hard law is a double-edged sword: when governments are likely to be held to their international legal commitments, they will be particularly concerned, when considering ratification, about their subsequent ability to comply. Relatively compliant states will ratify fairly readily, but less compliant states will take substantially longer to ratify or may refrain from participating altogether.<sup>10</sup> This legalization dilemma has led some to conclude that treaties that are broad but shallow are in many cases preferable to treaties that are narrow but deep (Barrett 2002).

Hence, I argue, the extent to which concerns about subsequent compliance affect the decision to ratify depends on the nature of the international legal commitment.<sup>11</sup> This yields the following empirically testable hypotheses:

*Hypothesis L<sub>1</sub>*: Compliant behavior is not systematically related to ratification of the FCCC. Among non-Annex 1 parties, compliant behavior is not systematically related to ratification of the Kyoto Protocol.

*Hypothesis L<sub>2</sub>*: Among Annex 1 parties, compliant behavior is positively related to ratification of the Kyoto Protocol.

Two additional testable implications ensue. First, we should observe no discernible difference in Annex 1 parties' and non-Annex 1 parties' propensity to ratify the FCCC, because neither group is making a hard legal commitment. Second, by the same reasoning, we should observe systematic differences in the two groups' propensity to ratify the Kyoto Protocol because the nature of their legal commitment is fundamentally different. Hence,

*Hypothesis L<sub>3</sub>*: Annex 1 status does not have a systematic impact on ratification of the Framework Convention.

*Hypothesis L<sub>4</sub>*: Annex 1 status has a systematic, negative impact on ratification of the Kyoto Protocol.

## Institutional Flexibility

Flexibility is generally thought to be useful when countries face uncertainty about the state of the world. For instance, duration and renegotiation provisions enable states to modify the agreement once they have learned more about their partners and their environment (Koremenos 2001). Escape clauses allow states to claim exemption when exogenous shocks or certain other unanticipated circumstances make compliance difficult (Rosendorff and Milner 2001). Part of the value of flexibility provisions undoubtedly lies in how they affect compliance and the ability to modify an agreement once a state has ratified. But equally important, these features affect states' ability to reach and participate in agreements. Koremenos (2001), for instance, maintains that the Nuclear Non-Proliferation Treaty's flexibility provisions made it possible to secure the participation of certain risk-averse states. Similarly, Rosendorff and Milner (2001) argue that without escape mechanisms, states would never have concluded or ratified certain multilateral trade agreements.

I am interested here in laying out a logic for how a state's ability to benefit from flexibility mechanisms affects its propensity to ratify an agreement. Before doing so, it is necessary to address the question of uncertainty. A core premise of the "rational design" literature is that states incorporate flexibility into agreements when they are uncertain about the current or future state of the world (Koremenos 2001; Koremenos, Lipson, and Snidal 2001). There was substantially more uncertainty about these questions in 1992 than in 1997, and yet it is the Kyoto Protocol that contains explicit flexibility mechanisms. An explanation lies in the two agreements' degree of legalization. Because the FCCC (for all parties) and the Kyoto Protocol (for non-Annex 1 parties) are relatively soft, the anticipated ex post costs of ratification were relatively low. As a result, there was little need to incorporate flexibility explicitly into those agreements. For the Annex 1 parties, the protocol is substantially harder; consequently, it was important to integrate explicit flexibility provisions into that agreement.

The Kyoto Protocol establishes three chief flexibility mechanisms for the Annex 1 parties.<sup>12</sup> First, an Annex 1 party can gain emissions credit by creating carbon sinks: engaging in activities that remove greenhouse gases from the atmosphere. Second, an Annex 1 party can gain emissions credit at home for reductions achieved by projects it sponsors in other countries. (If sponsored in a non-Annex 1 country, the project is part of the Clean Development Mechanism; if sponsored in an Annex 1 country, the project falls under the rubric of Joint Implementation. The emissions credit benefits to the sponsoring country are identical.) Finally, the protocol establishes an Emissions Trading System but leaves it to the Conference of the Parties to define the system's rules and guidelines.<sup>13</sup>

Consistent with arguments discussed above, I posit that states that expect to use the Kyoto Protocol's flexibility mechanisms ratify more readily than would otherwise be the case:

*Hypothesis F<sub>1</sub>*: Expected use of the Kyoto Protocol's flexibility provisions increases states' propensity to ratify, all else equal.

## Presentation of the Data

### Operationalization of the Legalization and Compliance Variables

To test the hypotheses discussed in the Legalization section, I create three variables. *Annex 1 party* equals 1 if a country was a party to Annex 1 of the FCCC in year  $t$  and 0 otherwise. Turning to the operationalization of compliance, I focus on CO<sub>2</sub>. My motivations for this decision are twofold. First, although scientists believe that various gases contribute to the greenhouse effect, CO<sub>2</sub> is by far recognized as the worst offender. Second, this is the gas for which data are the most widely available. The Framework Convention proclaims a goal, among Annex 1 parties, of returning to 1990 emissions levels. The most appropriate available measure of compliance with the FCCC, therefore, is country  $i$ 's *deviation from 1990 CO<sub>2</sub> emissions* in year  $t$ .<sup>14</sup> The Kyoto Protocol does not introduce new commitments for non-Annex 1 parties. Accordingly, the measure of non-Annex 1 party compliance with the Kyoto Protocol, *deviation from 1990 CO<sub>2</sub> emissions or target*, is simply the state's deviation from its 1990 emissions. The protocol introduces emissions reductions targets for the Annex 1 parties. Hence, for these states, *deviation from 1990 CO<sub>2</sub> emissions or target* equals country  $i$ 's deviation from its Kyoto target in year  $t$ .

As with most operationalizations of compliance, these measures are not perfect. For non-Annex 1 parties, concern remains about whether a percentage of 1990 production is appropriate. Two alternate measures were considered at various stages in the treaty negotiation process and continue to generate some discussion. Several developing countries, as well as certain EU officials, expressed some support for a scheme in which each state commits to an identical per capita emissions cap.<sup>15</sup> Many view this as the most equitable approach to compliance (FCCC 1998), but several key players opposed this measure on the grounds that it does not account for differences beyond government control (e.g., geography) that contribute to emissions. Others proposed emissions intensity (i.e., emissions per dollar of GDP) as an alternate measure (FCCC 1997b). Not surprisingly, developing countries were unresponsive of this approach. In addition, critics argued, it would enable quickly growing economies to avoid curbing emissions. Ultimately, both emissions per capita and emissions intensity were dismissed in favor of an emissions target expressed as a percentage of 1990 or base-year emissions.<sup>16</sup>

The various mechanisms through which Annex 1 parties can fulfill their Kyoto obligations make measuring compliance for these countries a very intricate task as well. I do not include these alternate mechanisms in the operationalization of compliance for two reasons. First, the Kyoto Protocol and subsequent accords establish that states should first and foremost pursue compliance via domestic emissions reductions. Second, I argued in the Institutional Flexibility section that states' ability to use these provisions provides interesting insight into how they weigh the potential costs and benefits of participation. Examining use of flexibility mechanisms as predictors of ratification is an interesting enterprise in its own right.

### Operationalization of the Flexibility Variables

The key variation of interest in hypothesis F<sub>1</sub> is the extent to which states expect to be able to use flexibility mechanisms. Measuring states' expectations, of course, is complex. To gauge anticipated use of carbon sinks, I create the variable *carbon sink credits*, which equals the emissions credits country *i* received for sink activities in year *t*, divided by its Kyoto emissions target. The primary drawback of this variable is that states did not know what their sink credits would be when most of them were considering ratification: the FCCC calculated it retrospectively. However, it seems reasonable to conclude that states could to some degree, albeit not perfectly, anticipate to what extent they would benefit from the carbon sinks mechanism. Indeed, many of the strongest sinks supporters are those that later received the most substantial credits (FCCC 1997a). Gauging states' expectations about programs involving credit at home for reductions sponsored in other countries is somewhat more straightforward because a pilot phase—AIJ—existed. The variable *impact of AIJ* measures the emissions reductions generated by each sponsor's AIJ (in metric tons of CO<sub>2</sub> equivalent), divided by its Kyoto emissions target (in metric tons of CO<sub>2</sub>). This yields a measure of the impact that AIJ (and, ultimately, the related programs that became institutionalized<sup>17</sup>) might have in relation to the sponsor's overall Kyoto reductions commitment.

### Control Variables

Increasingly, International Relations scholars recognize that social networks create and/or strengthen relationships between states, which in turn affect international cooperation/conflict. Ward (2006) argues that a state's centrality—defined as the number of IGO links it has to other states in the IGO network—shapes a state's perceptions of its interests and of good behavior, improves possibilities for sanctioning noncompliance, and facilitates information transfer and issue linkage, all of which can induce states to improve environmental practices. He finds that states' centrality in the network of international environmental regimes, and in the broader network of international regimes, is positively related to their degree of environmental

sustainability. Similarly, Dorussen and Ward (2008 [this issue]) find that centrality is associated with a lower probability of militarized conflict. To test whether centrality also increases states' propensity to ratify the core agreements of the climate change regime, I employ Ward's *network centrality* variable, which counts the number of IGO ties state *i* has to other states in the IGO network, on a yearly basis.<sup>18</sup>

I expect a positive relationship between *network centrality* and ratification. This is not to say that social networks universally increase cooperation. Indeed, a core idea in this literature is that these linkages are complex; they sometimes enhance cooperation, but they sometimes promote conflict (Hafner-Burton and Montgomery 2006). Hafner-Burton and Montgomery (2008 [this issue]), for instance, uncover a number of ways in which preferential trade agreements exacerbate economic conflict between states. Although I expect a positive relationship between *network centrality* and ratification, future research may provide insight by examining when networks might forestall regime participation.

NGOs play an increasingly important role in international environmental cooperation (Raustiala 1997); I focus here on their role in the ratification process. In several countries, these organizations are powerful domestic interest groups. Where key NGOs do not support the treaty, they may succeed in delaying or even preventing ratification (Raustiala 1997). Often, NGOs push for ratification. Greenpeace, for instance, lobbied intensely for the ratification of the FCCC (Porter and Brown 1996). Country data on individual membership in environmental NGOs are sparse. Collecting membership data on all environmental NGOs are beyond the scope of this article. On the other hand, existing data that count the number of all types of domestic NGOs are too blunt for my purposes. I instead focus on membership in Greenpeace, one of the most active NGOs in the climate change movement. The variable *Greenpeace memberships per capita* measures the number of members in that organization in a given country and year, divided by the country's population (Greenpeace 2006). This variable is admittedly a very blunt operationalization of the domestic strength of environmental NGOs. Nonetheless, it is a useful first cut at a complex and interesting phenomenon.

Development issues have been prevalent in climate change debates. Developing countries have generally been wary of the regime's potential effects on economic growth (Thompson 2005, 14); a related argument is that environmentalism is a luxury of the rich (A bit rich 1998, 15). Accordingly, I include in the analyses the variable (logged) *GDP per capita*. A vast literature exists on how domestic regime type affects international cooperation and conflict. In this issue alone, all the contributors consider democracy an important variable, either as a core theoretical component (Hansen, McLaughlin Mitchell, and Nemeth 2008 [this issue]; Mansfield and Pevehouse 2008 [this issue]) or as a control (Dorussen and Ward 2008 [this issue]; Hafner-Burton and Montgomery 2008 [this issue]). Regime type may matter for international environmental cooperation as well. Neumayer (2002), for instance, finds

that democracies are more likely than nondemocracies to make a variety of international environmental commitments. He raises two caveats: (1) the theoretical foundations of this finding are somewhat debatable, and (2) more commitments do not necessarily translate into better environmental outcomes (but see Li and Reuveny 2006). Nonetheless, Neumayer's (2002) findings suggest that regime type may be an important control. Accordingly, I include the Polity IV *polity* variable in my analyses.

To test the proposition that a state's decision to ratify is driven by the ratification decisions of other states, I create the variable *universality*, which equals the percentage of states that have ratified the agreement in question. To test the proposition that a state's decision to ratify is conditioned by the ratification decisions of other states in its region, I create the variable *regional ratification*, which equals the percentage of states in a state's region that have ratified the agreement in question. *Universality* and *regional ratification* may capture diffusion mechanisms, whereby states' policy choices are systematically conditioned by decisions that other states make (Simmons, Dobbin, and Garrett 2006). A related argument is that these variables capture the effect of social pressures to ratify, which manifest themselves globally or regionally (Finnemore and Sikkink 1998; Neumayer 2008).<sup>19</sup> To ensure that these variables do not simply reflect increases in adherents over time, I also include the variable *year* in the analyses.

States whose economic well-being depends heavily on the natural resources that scientists believe contribute to global warming may be particularly unwilling to support the climate change regime, irrespective of their emissions situation. While scientists have identified a number of culprits, two often stand out: coal and petroleum. *Coal and petroleum exports as a percentage of GDP* tests this proposition. The composition of a state's economy may also have an important impact on ratification. In many countries, the costs of mitigating climate change will fall heavily on the shoulders of industrialists, who in many cases have lobbied against the creation and ratification of the FCCC and the Kyoto Protocol (Porter and Brown 1996, 60). To test this theory, I include the variable *industry as a percentage of GDP* in my analyses.

## Empirical Analysis and Results

I examine the factors that determine ratification of the FCCC and the Kyoto Protocol, respectively. Following other research (cf. Neumayer 2008, 2008; Simmons 2000), I employ survival analysis, which estimates a state's "spell" (in months) to ratification. I do so rather than conducting a probit/logit analysis for three reasons. First, although states do withdraw from treaties (Helfer 2005), withdrawal does not occur regularly enough that one can assume a state's baseline probability of being a ratifier to be the same before and after ratification.<sup>20</sup> Consequently, it is arguably

most appropriate to model ratification as analogous to “death” in epidemiological research (Simmons 2000, 823). Second, because the dependent variable counts the ratification delay in months, survival analysis allows a more fine-tuned analysis of state behavior. Third, in the same way that the timing of Political Action Committees’ contributions reveals information about their preferences and calculus (Box-Steffensmeier, Radcliffe, and Bartels 2005), the timing of ratification provides information about states’ preferences and calculus. I report the results of parametric survival models (Weibull distribution) here but confirm their robustness by estimating Cox proportional hazards models as well.

### Ratification of the UN Framework Convention on Climate Change

I first examine ratification of the FCCC. Because data on the independent variables are generally only available yearly, the unit of analysis is the country year. The results appear in Table 1. Model 1 includes all the variables discussed in section 4, except *coal and petroleum exports as a percentage of GDP* and *industry as a percentage of GDP*, which I first exclude to ensure that any null findings with regard to the emissions variables are not simply attributable to overcontrolling.<sup>21</sup> Model 2 incorporates these two variables into the specification, but the results do not differ substantially. Finally, because the results for *regional ratification* are somewhat surprising (see pages 16–17), model 3 confirms that excluding this variable from the analyses does not alter the results on my core variables of interest.

Hypothesis L<sub>1</sub> posits no systematic relationship between compliance and FCCC ratification. Consistent with this hypothesis, *deviation from 1990 CO<sub>2</sub> emissions* indicates that among non-Annex 1 parties, higher emissions are associated with slightly *more* expedient ratification—a result that never approaches standard levels of statistical significance. Among Annex 1 parties, higher emissions are associated with slightly slower ratification, but this relationship also is not systematic.<sup>22</sup> Hypothesis L<sub>3</sub> anticipates that Annex 1 status does not have a systematic impact on FCCC ratification. Because the models include an interaction term, *Annex 1 party* indicates the effect of Annex 1 status on ratification when *deviation from 1990 CO<sub>2</sub> emissions* equals 0, that is, when a state’s emissions are identical to its 1990 emissions. For perfectly compliant states,<sup>23</sup> then, Annex 1 status does not have a systematic impact on FCCC ratification. This is consistent with hypothesis L<sub>3</sub>, but a more stringent test is to ask whether, at *high* levels of noncompliance, Annex 1 and non-Annex 1 parties’ ratification differs. The evidence indicates that even at high levels of noncompliance, Annex 1 parties do not ratify significantly more slowly or quickly than do non-Annex 1 parties.<sup>24</sup>

As a final test of hypothesis L<sub>1</sub> and hypothesis L<sub>3</sub>, I estimate the joint significance of the three legalization/compliance variables for each model. None of the tests approach conventional levels of significance.<sup>25</sup> All the evidence is consistent with hypothesis L<sub>1</sub> and hypothesis L<sub>3</sub>, but it is important to recognize that an inherent

**Table 1**  
**Analyses of Ratification of the Framework Convention on Climate Change**

Variable	Model 1	Model 2	Model 3
Legalization/compliance			
Deviation from 1990 CO <sub>2</sub> levels	.078 (.241)	.104 (.229)	.308 (.241)
Annex 1 party	.059 (.428)	-.248 (.432)	-.134 (.399)
Deviation from 1990 CO <sub>2</sub> Levels × Annex 1	-1.348 (1.663)	-1.819 (1.688)	-1.648 (1.568)
Network centrality	.428*** (.148)	.411*** (.148)	.226** (.108)
Greenpeace memberships per capita	.262*** (.101)	.280*** (.107)	.213** (.100)
GDP per capita	.024 (.103)	.146 (.127)	.112 (.118)
Polity	.043*** (.016)	.050*** (.016)	.014 (.013)
Universality	.046*** (.008)	.045*** (.008)	.015** (.007)
Regional ratification	-.051*** (.010)	-.056*** (.010)	—
Year	-.620*** (.191)	-.537*** (.182)	-.803*** (.199)
Coal and petroleum exports as percentage of GDP	—	-.047 (.066)	-.048 (.058)
Industry as percentage of GDP	—	-.001 (.011)	.000 (.010)
Constant	-10.594*** (1.401)	-11.831*** (1.565)	-10.018*** (1.335)
Probability > $\chi^2$	.0000	.0000	.0000
Number of observations	469	449	449
Number of countries	140	137	137
Number of ratifications	138	133	133

Note: Results of a parametric survival model (Weibull distribution). Dependent variable is the spell to ratification (in months). Columns contain coefficients and robust standard errors (in parentheses) clustered on country. GDP = gross domestic product.

\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

difficulty of testing null hypotheses is that one cannot confirm (statistically) the hypothesis of no effect. While robustness checks (reported in the appendix), as well as  $p$  values that never approach standard levels of statistical significance, provide some confidence that the results do not depend on model specification or overly strict requirements for statistical significance, one cannot entirely dismiss the possibility of a Type II error.

*Network centrality* and *Greenpeace memberships per capita* consistently bear the expected relationship to ratification. States that are more central in international social networks ratify significantly more quickly: a one standard deviation increase in a state's centrality makes it ratify 8.6 percent more quickly.<sup>26</sup> Similarly, states with higher Greenpeace membership rates ratify more quickly—an average increase leads to 6.3 percent faster ratification. These results provide evidence that a state's position in international networks and the strength of domestic NGOs (as proxied by Greenpeace memberships) have an important impact on ratification of the FCCC.

Democracies ratify more expediently in all models and robustness checks except model 3. Global ratification patterns also have systematic positive impact on a state's decision to ratify. Surprisingly, *regional ratification* is negative, suggesting that states are less prone to ratify if other states in their region are doing so. The reasons for this are unclear, but as model 3 indicates, the other findings do not depend on the inclusion of this variable. On the other hand, *GDP per capita*, *coal and petroleum exports as a percentage of GDP*, and *industry as a percentage of GDP* do not appear to have a systematic impact on ratification. In summary, the results provide support for hypothesis L<sub>1</sub> and hypothesis L<sub>3</sub> and also indicate that network centrality, domestic NGO memberships, democracy, and global policy diffusion/social pressures generally have an important impact on FCCC ratification.

### **Ratification of the Kyoto Protocol, All Parties**

I now examine ratification of the Kyoto Protocol. Here, one important consideration is how to treat the members of the EU. Individual EU members agreed in 1997 to fulfill their respective commitments jointly; they subsequently negotiated an internal burden-sharing agreement (European Council of Environment Ministers 1998) and submitted their ratifications on the same day (European Council 2002). Given the degree of institutional coordination that took place, it is clear that these ratifications were not independent of one another. In fact, it appears most reasonable to view them as one, rather than fifteen separate, ratifications.<sup>27</sup> Table 2 displays the results of analyses of Annex 1 and non-Annex 1 parties together. The predictors are identical to those used in the FCCC analyses, with the exception of the *emissions* variable (explained in the Operationalization of the Legalization and Compliance Variables section), *universality*, and *regional ratification* (the latter two are based on the Kyoto Protocol rather than the FCCC).

Hypothesis L<sub>1</sub> posits no systematic relationship between compliant behavior and ratification for non-Annex 1 parties. As in the FCCC analyses, the results indicate that higher emissions are associated with slightly *more* expedient ratification for this group of states, a relationship that never approaches standard levels of statistical significance.<sup>28</sup> Hypothesis L<sub>2</sub> expects compliant behavior to be positively

**Table 2**  
**Analyses of Ratification of the Kyoto Protocol**

Variable	Model 1	Model 2	Model 3
Legalization/compliance			
Deviation from 1990	.152	.173	.161
CO <sub>2</sub> levels or target	(.189)	(.193)	(.187)
Annex 1 party	-.807**	-1.113***	-.926**
	(.356)	(.403)	(.378)
Deviation from 1990 CO <sub>2</sub>	-1.527**	-1.930**	-1.610**
Levels or Target × Annex 1	(.730)	(.755)	(.731)
Network centrality	.139	.009	.024
	(.200)	(.214)	(.224)
Greenpeace	-.023	.006	.019
memberships per capita	(.150)	(.160)	(.163)
GDP per capita	.151	.365**	.290
	(.131)	(.186)	(.179)
Polity	.112***	.111***	.096***
	(.028)	(.030)	(.028)
Universality	.060***	.070***	.060***
	(.019)	(.019)	(.019)
Regional ratification	-.006	-.017*	—
	(.009)	(.009)	
Year	-1.095**	-1.065*	-1.130**
	(.542)	(.569)	(.553)
Coal and petroleum	—	-.185**	-.184**
exports as percentage of GDP		(.092)	(.093)
Industry as percentage of GDP	—	-.004	.001
		(.019)	(.018)
Constant	-8.038***	-10.149***	-9.264***
	(2.613)	(2.930)	(2.727)
Probability > $\chi^2$	.0007	.0000	.0000
Number of observations	632	612	612
Number of countries	129	125	125
Number of ratifications	78	76	76

Note: Results of a parametric survival model (Weibull distribution). Dependent variable is the spell to ratification (in months). Columns contain coefficients and robust standard errors (in parentheses) clustered on country. GDP = gross domestic product.

\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

related to Kyoto Protocol ratification for Annex 1 parties. In contrast to the FCCC analyses, the Kyoto Protocol analyses indicate that among this group of countries, higher emissions are indeed associated with significantly slower ratification.<sup>29</sup> If hypothesis L<sub>4</sub> holds, Annex 1 parties should ratify significantly more slowly than do non-Annex 1 parties. *Annex 1 party* is negative and statistically significant in all

three specifications, suggesting that even when an Annex 1 party is right on its Kyoto target, it takes substantially longer to ratify than does a similar non-Annex 1 party. This gap between Annex 1 and non-Annex 1 parties amplifies as emissions increase.<sup>30</sup>

I perform two additional tests of the legalization/compliance hypotheses. First, I estimate the joint significance of the three legalization/compliance variables. In contrast to the results of the same test for the FCCC, one can reject, at high levels of confidence, the null hypothesis that these variables jointly have no impact on Kyoto Protocol ratification.<sup>31</sup> Second, Figure 1 plots the marginal effect of Annex 1 status on ratification of the protocol as a function of the deviation from 1990 emissions or target. The x-axis displays values of the emissions variable that we observe among Annex 1 parties: it ranges from  $-.6$  to  $.6$ . The y-axis displays the predicted spell to ratification (in months). Figure 1 confirms two patterns observed in Table 2: (1) Annex 1 parties take significantly longer to ratify, unless their emissions are substantially below target; (2) Annex 1 parties' predicted spell to ratification increases as their deviation from target increases.

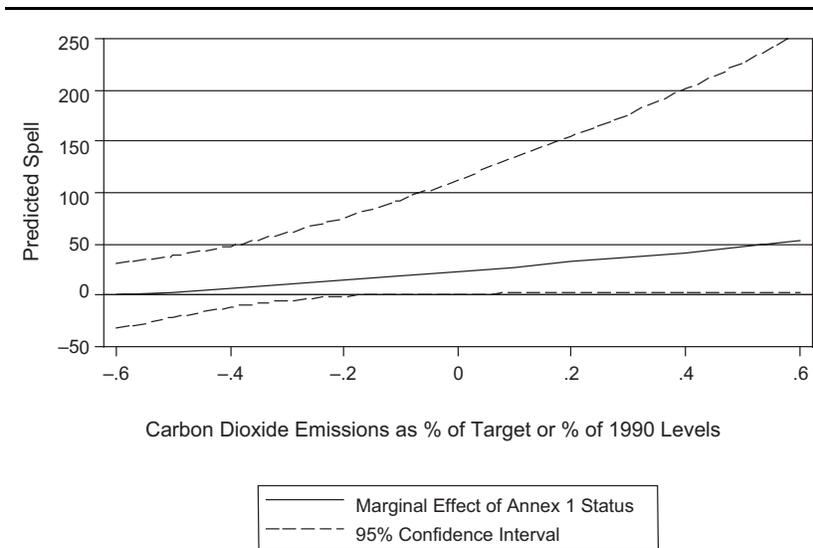
Whereas the results support the legalization/compliance hypotheses, there is little evidence that IGO network centrality or domestic Greenpeace memberships affect ratification of the Kyoto Protocol among all parties. Most of the other independent variables perform as in the FCCC analyses and so are not discussed in detail here. The main exception is that states that rely heavily on coal and oil exports ratify significantly more slowly than do other states.

### Ratification of the Kyoto Protocol, Separate Analyses

*Annex 1 parties.* I now examine Annex 1 and non-Annex 1 parties' ratification of the Kyoto Protocol separately. This provides an important robustness check. It also allows me to test the flexibility hypotheses and to assess whether any of the other independent variables affect the two groups differently. Table 3 displays the results. The specification in model 1 is identical to that in the analyses of all parties (Table 2, model 1), except that I include the flexibility variables but cannot include the variable *regional ratification*.<sup>32</sup> In model 2, I add a new variable to the specification: *EU candidate*.

I focus on the core hypotheses and on findings that differ from those in Table 2. The evidence in support of hypothesis L<sub>2</sub> remains robust: as noncompliance increases, Annex 1 parties ratify more slowly or not at all. Consistent with hypothesis F<sub>1</sub>, states that expect to use the protocol's carbon sinks mechanism ratify significantly more quickly: a one standard deviation increase in *carbon sink credits* is associated with 6.7 percent faster ratification in model 1.<sup>33</sup>

**Figure 1**  
**The Marginal Effect of Annex 1 Status on Ratification**  
**of the Kyoto Protocol, Table 2, Model 3**



Note: Y-axis values less than zero indicate that an Annex 1 party ratifies more quickly than does a comparable non-Annex 1 party; values greater than zero indicate that an Annex 1 party ratifies more slowly than does a comparable non-Annex 1 party.

The findings with regard to the other flexibility provision—*impact of AIJ*—are surprising, for they suggest that states using this mechanism ratify more *slowly* than would otherwise be the case (a one standard deviation increase around its mean is associated with a 6.7 percent increase in the predicted spell to ratification in model 1). What should one make of the results with regard to *impact of AIJ*, which go counter to hypothesis F<sub>1</sub>? First, one should note that although *impact of AIJ* is negative in all specifications, it is fairly sensitive to model specification and not systematically related to ratification in all robustness checks (see appendix for greater detail). Bearing this in mind, it is nonetheless interesting to consider the possible reasons for this negative relationship. An examination of which countries engage heavily in these activities provides some insight. Norway is the largest contributor as a proportion of its Kyoto target, followed by the United States and then Australia. A potential interpretation is that this variable captures a reverse causality, that is, that states

**Table 3**  
**Analyses of Ratification of the Kyoto Protocol**

Variables	Annex 1 Parties		Non – Annex 1 Parties	
	Model 1	Model 2	Model 3	Model 4
Compliance				
Deviation from 1990 CO <sub>2</sub> levels or target	–6.308** (2.860)	–3.199** (1.535)	.171 (.184)	.147 (.184)
Flexibility				
Carbon sink credits	4.362** (2.004)	5.256** (2.252)	—	—
Impact of activities implemented jointly	–3.444** (1.366)	–3.446 (2.213)	—	—
Network centrality	.881 (.723)	1.259** (.510)	–.041 (.163)	–.133 (.151)
Greenpeace memberships per capita	–1.275*** (.470)	–.933 (.805)	14.784*** (5.428)	7.74 (5.748)
GDP per capita	2.524 (2.225)	4.393 (2.945)	.117 (.128)	.086 (.127)
Polity	.600 (.575)	.052 (.207)	.100*** (.027)	.094*** (.026)
Universality	–.030 (.037)	–.070 (.054)	.062*** (.022)	.066*** (.023)
Regional ratification	—	—	–.003 (.011)	–.005 (.010)
Year	–.802 (1.061)	–.203 (1.223)	–1.180** (.601)	–1.140* (.607)
EU candidate	—	4.226** (1.949)	—	—
Beneficiary of activities implemented jointly	—	—	—	.940*** (.276)
Constant	–16.481 (105.974)	–101.906 (134.078)	101.37* (56.731)	97.791** (57.162)
Probability > $\chi^2$	.0000	.0001	.0000	.0000
Number of observations	122	122	510	510
Number of countries	22	22	106	106
Number of ratifications	16	16	62	62

Note: Results of a parametric survival model (Weibull distribution). Dependent variable is the spell to ratification (in months). Columns contain coefficients and robust standard errors (in parentheses) clustered on country. GDP = gross domestic product.

\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

that anticipate having difficulty ratifying (because of high emissions) engage more heavily in AIJ.<sup>34</sup> There are two reasons states might do this.

First, states might use AIJ to assess the feasibility and cost-effectiveness of these activities as an aspect of overall mitigation efforts. Indeed, as Dolšák and Dunn

(2006) maintain, AIJ can be viewed as a “laboratory” for understanding whether/how subsequent programs would work.<sup>35</sup> Second, states might contribute heavily to AIJ in the hope of legitimizing these projects either as a viable aspect of Kyoto Protocol implementation (Dolšak and Dunn 2006) or as an alternative to the protocol. Australia and the United States have in recent years begun emphasizing the latter, pursuing additional projects similar to AIJ outside the Kyoto regime.<sup>36</sup> These explanations are speculative, and the negative relationship between *impact of AIJ* and ratification is not robust to all specifications. Nonetheless, these developments are interesting because they suggest that states may sometimes use flexibility mechanisms in ways that many treaty drafters likely did not anticipate or want.<sup>37</sup>

The chief differences between the analyses of all parties and the Annex 1 parties alone are as follows. With the exception of model 1, all other specifications (including robustness checks) reveal that Annex 1 parties with more links to other states in the IGO network ratify significantly more quickly. Neither regime type<sup>38</sup> nor global ratification patterns appear to affect Annex 1 parties’ ratification. EU candidates ratify substantially more expediently than would otherwise be the case—21.5 percent more quickly, all else equal. This evidence is consistent with Stone and McLean (2005), who argue that the EU has assumed a “hegemonic leadership role” in the climate change regime, pressuring particular states to ratify to receive incentives. The inclusion of this variable does not alter the results notably, other than its effect on *impact of AIJ* (discussed above).

*Non-Annex 1 parties.* The results of analyses of non-Annex 1 parties appear in Table 3, models 3 and 4. The results are consistent with the analyses of all parties (Table 2), including the finding that emissions behavior has no discernible impact on non-Annex 1 parties’ ratification. Model 4 introduces a variable indicating whether a state was a *beneficiary of AIJ* (FCCC 2002). The Kyoto Protocol would essentially institutionalize AIJ, further enabling the states in which these projects took place to obtain funding and technology transfers (Repetto 2001). This provided AIJ beneficiaries an additional incentive to ratify. The results strongly support this idea: beneficiaries ratify 22.3 percent more quickly than states not involved in these programs, a result that is consistently highly statistically significant.

### **Additional Discussion**

Two potential criticisms merit consideration. First, some may argue that although this article tackles the problem of endogeneity at the ratification phase, it suffers from endogeneity problems at the treaty design phase. Specifically, if negotiators know that the costs of coming into compliance will matter for regime participation, they should simply set targets so that the difficulty of coming into compliance is equal for all states involved in the regime.<sup>39</sup> Theoretically, this is possible. In reality, a

number of factors often drive the outcome of international bargaining, including not only the relative difficulty of coming into compliance but also relative power (economic, military, etc.), domestic constraints, and concerns about equity (the latter may not necessarily lead to identically difficult targets for all parties). In addition, leaders rarely have full information about how difficult it will be to come into compliance, as they cannot necessarily foresee how technology will evolve or what their respective countries' economic situations will be.

A second potential criticism is that, if all states eventually ratify, the fact that it takes some longer to do so is of little importance. Three comments are in order here. First, even if a state eventually commits, the timing of ratification provides important information about governments' preferences and calculus, as well as some indication of the subsequent prospects of compliance. Second, delays in ratification can stall entry into force in all countries. Indeed, Russia's sluggish ratification of the Kyoto Protocol delayed the agreement's entry into force in all other countries that had ratified. Third, some states choose not to ratify. Indeed, I expect that whereas commitment to soft law will be quasi-universal, commitment to hard law will not. The nonratifiers will be those whose behavior deviates most notably from what the treaty prescribes or proscribes. To some extent, flexibility provisions can help some states mitigate this dilemma, even if they do not fundamentally alter the relationship between compliance and ratification.

## Conclusion

This article has argued that there is an inherent trade-off between soft and hard law. Soft agreements achieve widespread participation fairly quickly, but leaders do not appear to be particularly concerned, when ratifying, about their ability subsequently to comply with such agreements. Hard agreements make shirking more difficult, which is generally thought to be key in ensuring compliance. But as legalization increases, states become more concerned about their ability subsequently to comply, and the least compliant states refrain from committing altogether. The evidence strongly supports these propositions. An important upshot of the analyses presented in this article is that the harder a treaty is, the more concerns about subsequent compliance matter for ratification.

Flexibility provisions can help mitigate this legalization dilemma, even if they do not fundamentally alter the relationship between compliance, legalization, and ratification. Indeed, the evidence suggests that the Kyoto Protocol's carbon sinks mechanism made commitment less costly for some states, leading to ratification when it may not otherwise have occurred (or may not have occurred as quickly). The findings also highlight the importance, when gauging how flexibility provisions affect state behavior, of accounting for differences in states' ability to use these

mechanisms. Yet the results also suggest that flexibility provisions are not always conducive to ratification. The evidence with regard to AIJ, although mixed, indicates that states sometimes attempt to build alternative regimes around flexibility provisions. This is interesting because it demonstrates that states sometimes use these mechanisms in ways that many treaty drafters likely did not anticipate or want.

This article has also uncovered interesting ways in which international social networks and domestic NGO pressure affect ratification. Ultimately, the results suggest that these factors led to substantially faster ratification of the FCCC but did not have a systematic impact on ratification of the Kyoto Protocol. Future research would benefit from examining whether these patterns are specific to the international climate change regime or extend to other treaties and issue areas. A more detailed exploration of the micro foundations of social network processes and domestic NGO influences would undoubtedly shed light on this question.

What implications do this article's findings have for international efforts to curb greenhouse gas production? Although the FCCC raised awareness about the problem of climate change and helped set the agenda for future negotiations, most agree that it has not led to improvements in emissions (Repetto 2001). At present, one can only speculate about whether the Kyoto Protocol will lead to substantial emissions reductions.<sup>40</sup> On the one hand, the findings paint a relatively skeptical portrait of the protocol's ability to induce meaningful change in greenhouse gas production. For the non-Annex 1 parties, the soft character of the law means that there is little concrete incentive to improve behavior. For the Annex 1 parties, the hard character of the law leads states to commit when they are *de facto* relatively compliant; the very states whose behavior is most susceptible to be shaped by the law are also the most likely to remain outside the regime.

On the other hand, the results also indicate that emissions do not tell the entire story of Annex 1 parties' selection into the Kyoto Protocol. States ratify for a variety of reasons, including because flexibility provisions (in this case carbon sinks) can make commitment less costly for certain states. If those states would not have engaged in sink activities if they had not ratified, then this is good news for the environment—even if on a relatively small scale. For several of these ratifiers, moreover, sink activities alone will not suffice: to adhere to their Kyoto obligations, these countries will require additional emissions reductions strategies. This may also be good news for the environment.<sup>41</sup> Even so, two considerable challenges remain: U.S. and Australian greenhouse gas production, and the growing emissions of developing countries. Neither the FCCC nor the Kyoto Protocol has thus far proven able to force, cajole, or persuade these countries, which together represent over 70 percent of global CO<sub>2</sub> emissions (FCCC 2006), to modify their behavior. New, and creatively different, solutions will likely be necessary if the international community is to achieve the emissions reductions necessary to avoid the most pernicious effects of human-induced climate change.

## Notes

1. Because ratification, acceptance, approval, or accession all have the same meaning under international law (United Nations 1969), I refer to them under the general term *ratification*.

2. Technically, the term *compliance* does not apply until a country has ratified. For ease of exposition, I use the term universally.

3. At the time of final submission of this article, Australian Prime Minister-elect Kevin Rudd has stated that ratification of the Kyoto Protocol is one of his top priorities.

4. I also make no claims about the superiority of one type of law over the other. As Abbott and Snidal (2000) point out, both have distinct costs and benefits.

5. The appendix is available at <http://www-personal.umich.edu/~janavs/climatechange.html>.

6. See Reus-Smit (2003) for a discussion of the limitations of (1); see Keohane (1997) for a discussion of the limitations of (2).

7. There is an important potential exception. If soft law changes perceptions and/or identities, or if it creates a rallying point for pro-environment groups, it may provide an impetus for change. This does not appear to have been the case with the FCCC; (other, perhaps, than to set the stage for a new round of negotiations), since most parties openly admitted that the convention did little to alter state practice (Repetto 2001). More generally, these mechanisms are likely much more difficult to anticipate than are the hard law enforcement mechanisms: it is difficult to know *ex ante* how perceptions and identities will shift in reaction to a treaty or how/which groups will rally. Indeed, treaties can sometimes have a *negative* (i.e., anticompliance) effect on public perceptions/identities. As a result, the possibility that soft law will provide an impetus for change is not likely to weigh heavily on leaders' ratification decision.

8. See Shelton (2000) for a differing perspective.

9. See for example Hafner-Burton's (2005) argument about preferential trade agreements (PTAs) and human rights. However, she is careful to note that in addition to offering the stick of enforcement if states do not comply, hard PTAs offer the carrot of trade concessions. This helps mitigate the participation problem.

10. As Downs, Rocke, and Barsboom (1996) point out, this dilemma often leads states to avoid agreements that have strong enforcement mechanisms and require substantial changes in behavior. My focus is slightly different: I am chiefly interested in understanding how, *given the existence of a particular treaty*, compliant behavior affects ratification. See Additional Discussion section for further discussion.

11. See Goodliffe and Hawkins (2006) and Hathaway (2003) for similar arguments in the realm of international human rights law.

12. For an insightful discussion of the negotiation of these mechanisms, see Thompson (2005).

13. Emissions trading is somewhat different from the two other flexibility devices: it is essentially an *ex post* "fine" that Annex 1 parties with above-target emissions pay to Annex 1 parties with below-target emissions. Because those fines will be assessed in 2012, it was (and still is) difficult for governments to predict accurately to what extent they would exploit this mechanism. It is not clear how one might measure states' (expected) use of this mechanism in an analysis of ratification. For both of these reasons, I do not examine this third flexibility provision.

14. See the appendix for additional information on these and other independent variables.

15. Global emissions were approximately one ton per capita when the Kyoto Protocol was signed. Emissions averaged approximately three tons per capita among all Annex 1 parties and six tons per capita in the United States (Masood 1997).

16. See Barrett (2003) for an insightful discussion.

17. See the discussion of the Kyoto Protocol's flexibility mechanisms (p. 9).

18. See Ward (2006) for a technical and more detailed conceptual description. This variable measures centrality in the *overall* international governmental organization network. The primary reason for this is pragmatic: annual data are only available for the former. However, Ward (2006) finds that the two variables are highly correlated (in 2000) and that centrality in the overall network is, in fact, a more

consistent predictor of sustainable environmental practices. This is consistent with Ingram, Robinson, and Busch's (2005) findings.

19. These variables are not without problems: in addition to the mechanisms discussed here, they may also capture the effect of other factors that are correlated with increases in ratification but are not measured by other independent variables. The results are not sensitive to the inclusion of these two variables.

20. As of January 2008, no state has withdrawn from the FCCC or the Kyoto Protocol.

21. States' reliance on fossil fuels and industry likely affects their emissions, so it is not entirely clear whether it is appropriate to include these variables in the analyses.

22. I obtain this estimate by calculating the joint significance of *deviation from 1990 CO<sub>2</sub> emissions* and the interaction term. *P* values range from .305 to .441. The interaction term alone tells us whether emissions affect Annex 1 parties differently than they affect non-Annex 1 parties. There is no evidence of a systematic differential effect.

23. Many of the post-Communist countries, for instance, were perfectly compliant or had emissions below 1990 levels.

24. *P* values from a test of the joint significance of *Annex 1* and the interaction term range from .313 to .524.

25. *P* values range from .336 to .549.

26. I calculate all average changes by calculating the effect of a one standard deviation change around the variable's mean on the predicted spell to ratification. All other variables are held at their mean.

27. Most independent variables are available at the EU level or are identical for all EU members (e.g., *democracy*). If this is not the case, I collapse the yearly national-level observations into one observation per year, weighting by the country's voting weight in the EU Council at the time.

28. The interaction term, moreover, tells us that emissions affect Annex 1 parties significantly differently than they affect non-Annex 1 parties. This cannot confirm the null hypothesis for non-Annex 1 parties but it does provide additional confidence.

29. In a test of the joint significance of *deviation from 1990 CO<sub>2</sub> emissions* and the interaction term, *p* values range from .016 to .053.

30. In a test of the joint significance of *Annex 1* and the interaction term, *p* ranges from .002 to .011.

31. *P* values range from .005 to .012.

32. This is because all Annex 1 parties are from the Organization for Economic Cooperation and Development or Eastern Europe.

33. Why this provision bears a positive relation to ratification whereas Activities Implemented Jointly (AIJ) is negatively related to ratification is beyond the scope of this article, but a difference of likely importance is that the former requires changes in domestic practices, whereas the latter's only requirement of sponsors is funding.

34. This does not explain why Norway is heavily involved in AIJ. Sweden and the Netherlands are also top sponsors (but are part of the EU observations). It is probably no coincidence that these three countries are among the top four donors of foreign aid (as a percentage of gross national income). For these states, AIJ may be part of a larger aid program. See Dolšak and Dunn (2006) for large-*N* findings consistent with this idea.

35. Recall that AIJ was a pilot project.

36. See Taylor (2007) for recent developments. The Asia-Pacific Partnership on Clean Development, created in 2005, is a prime example of this.

37. As explained earlier, the Kyoto Protocol and subsequent accords establish that programs such as AIJ were not intended as the chief component of the climate change regime; states should first and foremost focus on curbing domestic emissions. The Asia-Pacific Partnership is careful to state that it is a complement rather than an alternative to the Kyoto Protocol. Increasingly, however, some leaders have

suggested that flexible, AIJ-inspired approaches are preferable to the protocol's "top-down, prescriptive, legalistic" emissions target system (Taylor 2007).

38. This most likely results from the fact that *democracy* varies little in this sample.

39. This relates to Gilligan's (2004) argument that if states can set their policies at different levels, a broader-deeper trade-off in international multilateral agreements does not exist.

40. Many of the states that have ratified the Kyoto Protocol did so in or after 2002, the last year for which emissions data are currently available for all countries.

41. The New Zealand case is instructive in this regard. One of the chief arguments in favor of ratification was the availability of sink credits, which the government expected would make participation in the protocol a net benefit for the country (New Zealand Department of the Prime Minister and Cabinet 2002). For a variety of reasons beyond the scope of this article, that assessment proved inaccurate; even with sink credits, the country's emissions will be well over target during the first commitment period (Sparks fly 2007). Some leaders have proposed withdrawal from the protocol, but most maintain that New Zealand must remain a party and cut domestic emissions or pay for its over-target emissions through international emissions trading. Domestic reductions would constitute a net benefit for the environment, but international emissions trading may not. Some have criticized the latter as a way for rich countries to continue irresponsible domestic emissions policies, while the former communist Annex 1 parties receive cash payments for reductions that would have occurred anyhow (Kay 2007).

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