

Is There a “Depth versus Participation” Dilemma in International Cooperation?

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Abstract: Much of the International Relations literature assumes that there is a “depth versus participation” dilemma in international politics: shallower international agreements attract more countries and greater depth is associated with less participation. We argue that this assumption is too simple and probably misleading because the depth of any given cooperative effort is in fact multidimensional. This multidimensionality manifests itself in the design characteristics of international agreements: in particular, the specificity of obligations, monitoring and enforcement mechanisms, dispute settlement mechanisms, positive incentives (assistance), and organizational structures (secretariats). We theorize that the first three of these design characteristics have negative and the latter three have positive effects on participation in international cooperative efforts. Our empirical testing of these claims relies on a dataset that covers more than 200 global environmental treaties. We find a participation-limiting effect for the specificity of obligations, but not for monitoring and enforcement. We do, however, observe that assistance provisions in treaties have a significant and substantial positive effect on participation. Similarly, dispute settlement mechanisms tend to promote treaty participation. The main implication of our study is that countries do not appear to stay away from agreements with monitoring and enforcement provisions, but that the inclusion of positive incentives and dispute settlement mechanisms can promote international cooperation. In other words, our findings suggest that policymakers do not necessarily need to water down global treaties in order to obtain more participation.

In this paper we are interested in the implications of institutional design characteristics for participation in international agreements. One of the most fundamental questions in International Relations research and also policymaking is why some international problem solving efforts succeed whereas others fail. The conventional wisdom explaining variation in success of cooperative efforts is quite sober in that it assumes lowest common denominator solutions to most international problems. By implication, harder problems – for instance those characterized by dilemma games, great scientific and technical complexity, and high implementation costs – are associated with weaker or less ambitious cooperation. Conversely, we should expect more agreements and more participation of countries in these agreements in the “easy cases”. Both realist and liberal-institutionalist perspectives on International Relations share this general view, though liberals tend to be somewhat more optimistic (Oye 1986; Stein 1990; Downs, Rocke and Barsboom 1996; Sandler 2008).

One category of factors that, arguably, play an important role in international cooperation has received increasing attention in recent years, namely institutional design features (Mitchell 1994; Author). Indeed, policymakers invest enormous amounts of time and effort in developing ever more complex international agreements; their key concern is clearly to design agreements in ways that make them acceptable to as many negotiating parties as possible while also solving the problem of concern. The liberal-institutionalist perspective on International Relations interprets such efforts as evidence for the assumption that outcomes of international cooperation efforts are not pre-determined by whether a given international policy-problem is difficult or easy, in some sense of these terms. On the contrary, it argues that policymakers are at least to some extent able to solve difficult problems as well if they make appropriate choices in designing cooperative arrangements.

Our work is motivated by an important gap in the existing literature on international institutions. The rational design of international institutions literature (Abbott and Snidal 2000; Koremenos, Lipson and Snidal 2001; Mitchell and Keilbach 2001) concentrates almost exclusively on explaining design characteristics as a function of issue area or policy-problem characteristics (that is, institutional design is the dependent variable in such studies). Several studies examine the implications of particular design choices for the formation and success of international institutions, and most studies of this kind focus on one particular aspect of institutional design and one specific cooperative effort. For instance, in a pioneering study, Mitchell (1994) demonstrates that the international regime against intentional oil pollution of the oceans (MARPOL) became more successful because its member states added equipment standards to the pre-existing discharge standards. This modification of the regime facilitated monitoring and enforcement. In another important study of this type, von Stein (2008) shows that one particular institutional design feature of the global climate change regime, namely flexibility mechanisms, contributed to more participation in the regime.

Our work contributes to this literature both by developing a theoretical argument concerning the implications of a larger set of institutional design characteristics, and by testing this theory on a large set of international cooperative efforts. This broader scope of our theory and empirical analysis, compared to the existing literature, allows us to reassess the conventional, one-dimensional view of international cooperation in terms of a

depth versus participation dilemma and argue in favor of an approach that uses a multidimensional concept of “depth”.

Hence the starting point for our theorizing and empirical analysis is the widely held view that there is a depth versus participation dilemma in international cooperation. The following example from a seminal study by Downs et al. (1996) illustrates this alleged dilemma:

The Mediterranean Plan achieved consensus by eliminating any meaningful restrictions on dumping and providing no enforcement mechanism for those minimal targets and restrictions that were agreed to. As a result, it has been an embarrassing failure. Pollution has increased, dolphin hunting continues, and despite a European Union ban on drift nets longer than 2.5 kilometers, the rules are widely flouted. The result has been a collapsing ecosystem in the Mediterranean.

We submit that a one-dimensional depth versus participation perspective – that is, the view that “shallower” agreements attract more countries and greater depth is associated with less participation – is too simple and potentially misleading. The rational design of institutions literature (Abbott, Keohane and Moravcsik 2000; Abbott and Snidal 2000; Marcoux 2009) has in fact shown that governments are very sophisticated in developing complex institutional designs that stack treaties with a great variety of features, for instance opt out provisions, waivers, and withdrawal clauses, in an attempt to obtain a high degree of participation while also solving the problem of concern. Consequently, we should expect that how treaties are designed matters for participation, and that different design features can have different effects on participation, *independently* of the factors that determine bargaining outcomes.¹

After a literature review in the next section we develop the argument that different types of institutional design characteristics, all of which reflect the depth (or ambition level) of cooperation, may affect participation. We posit that treaties with more specific obligations as well as those with monitoring and enforcement mechanisms are likely to attract fewer countries. Conversely, we submit that treaties with assistance and dispute settlement mechanisms as well as treaty-specific secretariats are likely to attract more countries.

We then test these arguments on a new dataset that covers more than 200 global environmental treaties. With this empirical focus we hold the pool of potential member countries constant and limit unit heterogeneity at least to some extent while still allowing for strong variation in institutional design features.

We find that the specificity of obligations has a negative and statistically significant effect on participation rates (measured by treaty ratifications) and the existence of monitoring and enforcement mechanisms has no significant effect. In contrast, we find more support for “positive” compliance mechanisms: assistance provisions in treaties have a significant and substantially positive effect on participation, and dispute settlement mechanisms also increase the number of ratifiers.

We interpret these findings as moderately good news for international cooperation. It

¹ International treaty-making typically involves two key steps: signature, which formally concludes the bargaining phase and expresses the consent of the negotiating government to the treaty text; and ratification, which expresses legislative consent and thus makes the treaty legally binding for the respective country at the domestic level.

may well be that some of the hardest to solve problems never make it onto the global bargaining agenda, or that negotiations on such problems fail to produce a treaty. But we still find that, once treaties have been negotiated and are open to all members of the international community, countries do not appear to stay away from those that mandate deeper cooperation. We also observe that the inclusion of positive incentives and dispute settlement mechanisms promotes international cooperation. Moreover, our evidence supports the assumption that these effects are independent of factors that shape bargaining outcomes. Hence there is considerable room for hope that policymakers can design international agreements in ways that ascertain large participation without having to sacrifice too much in terms of depth. In other words, our findings suggest that policymakers do not necessarily have to water down global treaties in order to obtain more participation.

Literature Review

Recent research offers important insights into how various international treaty design features, such as the general character of legal obligations, monitoring, enforcement, and dispute settlement mechanisms affect outcomes of international cooperative efforts, notably compliance (Guzman 2005; Hathaway 2005; Raustiala 2005).

Guzman, for example, argues that three design elements, namely hard law, dispute settlement mechanisms, and monitoring increase the costs associated with treaty violations and thus increase compliance. Other studies have explored possible tensions or tradeoffs between treaty design choices and compliance (Downs et al. 1996). Downs et al. (1996:383) characterize cooperative efforts primarily in terms of “depth”, which in their words means “...the extent to which [an international treaty] requires states to depart from what they would have done in its absence.” They argue that such depth comes with an important tradeoff in the sense that treaties mandating deeper cooperation are likely to suffer from more non-compliance and/or less effectiveness. To be clear, Downs et al. (1996) focus mainly on enforcement and compliance to account for the puzzling fact that most international agreements are complied with. They hypothesize that high rates of compliance are due to the fact that most international agreements are weak in terms of obligations, enforcement, or both. However, their argument can easily be extended to other aspects of international cooperation, for example participation in international treaties.

The literatures on legalization and the rational design of international institutions have been instrumental in “unpacking” the depth of cooperation concept. Many observers of international politics have in fact noted a trend toward stronger legalization over the past few decades. States have formed a vast array of international legal arrangements in attempts to solve collective action problems and advance mutual interests. Such legal arrangements aim at stabilizing expectations, reducing transaction costs, providing or facilitating monitoring, settling disputes, increasing audience costs of commitments, providing focal points, and increasing reputational costs and benefits related to conformity of behavior with legal rules (Keohane 1984; Lipson 1991; Martin 1993; Abbott and Snidal 1998, 2000).

Traditional international law scholars assume that “legality is best understood as a binary, rather than a continuous attribute” (Raustiala 2005:586). In their view, hard law creates legally binding obligations for states, whereas soft law creates only political or moral obligations. However, this binary view has in recent years gradually given way to notions of soft law not only as non-legally binding agreements, but also as legally binding agreements that lack features deemed necessary for an agreement to be “hard law”, such as precision of obligations or enforcement mechanisms. Many legal scholars now accept that “hard law” can vary significantly in substance and structure. Substance refers to the precision of the agreement and the obligations imposed on the contracting parties by the agreement; and structure refers to provisions for monitoring and enforcing commitments. Chinkin (1989:851), for example, argues that “the use of a treaty form does not of itself ensure a hard obligation. ... If a treaty is to be regarded as ‘hard’, it must be precisely worded and specify the exact obligations undertaken or the rights granted.”

This trend in how legal scholars define hard and soft law is also reflected in political science research on legalization. Abbott and Snidal (2000), for instance, argue that legalization is not binary. That is, international rules/laws are not simply present or absent in a given policy area. Rather, the degree of their legalization varies from hard law to soft law. They distinguish between hard and soft law according to three dimensions: obligation, precision, and delegation.² In this context, obligation means that states are legally bound by the respective agreement and therefore subject to scrutiny under the rules and procedures of international law. Precision means that the regime’s “rules unambiguously define the conduct they authorize, require, or proscribe”(Abbott and Snidal 2000:40). Delegation means that third parties are granted authority to implement, interpret, and apply the rules, and that a dispute settlement mechanism and an amendment process exist. When only one of the three elements is emphasized the law is seen as soft.

This differentiated perspective on the characteristics of international law and institutions is interesting for descriptive purposes, but also has important implications for how we explain international cooperation. In this paper, it allows us to connect the concepts of depth of cooperation and legalization. It leads us away from a simple, one-dimensional analysis of the depth versus participation problem. Instead, it allows for distinct (positive or negative) effects of particular institutional design characteristics on participation in international cooperative efforts.

Both international relations and international law scholars agree that international treaties vary to a great extent in terms of the precision and stringency of obligations as well as compliance mechanisms set forth therein. Some treaties do not require member states to implement any changes in their policies, whereas others require major changes. For example, the UN Framework Convention on Climate Change (FCCC) has imposed only minor obligations on member states, with primary obligations concerning reporting and review, whereas the Kyoto Protocol contains clearly specified quantitative emission reduction targets that a specific group of countries must reach by a specific year. The existing literature offers some insights into how such institutional design features may affect participation in international agreements. The prevailing view is that while “soft”

² Note that Abbott and Snidal (2000) define legalization in terms of key characteristics of rules and procedures, and not in terms of their effects on state behavior.

commitments are likely to attract more states but result in less problem solving, “hard” commitments are likely to limit or reduce participation, particularly by those countries whose behavior is least consistent with treaty objectives.

One of the key implications of the Downs’ et al. (1996) argument is that countries should be less likely to participate in agreements that are perceived to be demanding in terms of obligations. Several authors (Downs, Danish and Barsoom 2000; Barrett 2003:292-306; Raustiala 2005) concur with Downs et al. (1996) and discuss the trade-off between depth and breadth of an agreement and its effect on treaty membership size. Raustiala (2005) argues that agreements containing substantive provisions that are “too deep” that is, that require overly ambitious modifications of state behavior, are more likely to be ratified by few countries. Downs et al. (2000) also state that more stringent legal obligations reduce membership in environmental, trade and arms control agreements. Several studies find empirical evidence for this claim. Hathaway (2007), examining the propensity of states to ratify human rights treaties, finds that countries are less likely to ratify a human rights treaty if they have to change their human rights behavior as a consequence. Similarly, Goodliffe and Hawking (2006) study states’ commitment to the international Convention Against Torture. They find that “policy change costs”, unintended consequences of the treaty, and the “cost of foreclosing policy options in the face of uncertainty” deter countries from signing or ratifying.

Conversely, countries should be more likely to participate in agreements that involve less precise or weaker obligations. The reason is that such agreements give countries more opportunities to interpret and apply international commitments according to their particular needs. We have not found any studies that examine how the specificity or strength of obligations per se, measured in some aggregate form, affects participation in international cooperative efforts. However, a few studies deal with specific facets of the issue, notably flexibility provisions. For example, Rosendorff and Milner (2001) argue that without “escape clauses” states would not have ratified certain multilateral trade agreements. Koremenos (2001, 2005) notes that the participation of certain risk-averse states in treaties in several issue-areas (economic, human rights, environmental, and security) was mainly due to their flexibility provisions. Von Stein (2008) finds evidence that one of the Kyoto Protocol’s flexibility mechanisms, namely carbon sinks, contributed to the ratification of the Protocol by Annex I countries. She argues that policymakers face the challenge of designing institutions in ways that „deter defection without deterring participation“ (von Stein 2008:243).

Another important aspect of institutional design is monitoring and enforcement. Many but far from all international agreements set up monitoring and enforcement mechanisms. For instance, the Kyoto Protocol delegates to the Conference of Parties the power to monitor Annex 1 countries’ implementation and compliance efforts. The Montreal Protocol for protecting the stratospheric ozone layer contains several enforcement provisions, including trade measures. Strong monitoring and enforcement measures are widely thought to promote compliance with agreements: they increase the credibility of commitments and reputation costs associated with renegeing on commitments. Hence they serve to prevent opportunistic behavior. On the downside, agreements that delegate authority for such purposes to an international or supranational body may be perceived by states as a threat to their sovereignty and autonomy. Abbott and Snidal (2000), for

example, note that delegation of monitoring authority makes it more difficult for states to interpret the respective agreement in a self-serving or biased manner. This constraint makes states reluctant to delegate authority for the purpose of monitoring and enforcement. Hathaway (2005) argues that agreements that include strong enforcement mechanisms are less likely to attract many countries. Consequently, Goldstein and Martin (2000) argue that international agreements should incorporate only some flexibility in their enforcement procedures since too little enforcement may encourage opportunism and too much may deter cooperative deals all together. Cole (2005, 2009) argues that states ratify international treaties with monitoring mechanisms only when the compliance costs are low. Using data for up to 142 countries between 1966 and 2000, he examines membership patterns (signature and ratification) of the International Human Rights Covenants. He finds evidence that ratification is influenced by the strength of a treaty's implementation provisions rather than its substantive content. In particular, whereas the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the International Covenant on Civil and Political Rights (ICCPR), which protect different rights but establish comparable implementation mechanisms, exhibit similar patterns of ratification, the ICCPR and the First Optional Protocol to the ICCPR, which protect identical rights but establish different implementation provisions, exhibit dissimilar patterns of ratification.

In addition to monitoring and enforcement mechanisms, states may also incorporate dispute settlement procedures in international agreements to increase the credibility of and compliance with commitments (Guzman 2005; Smith 2000). Such procedures can be valuable, but they may also have participation-limiting effects because they tend to decrease governments' policy discretion and control over disputes and their outcomes. Morris (2001:15), for instance, argues that "... states are particularly unwilling to enter into broad commitments to adjudicate future disputes, the content and contours of which cannot be foreseen." States are, in general, reluctant to relinquish control over their disputes to third-parties and may instead prefer to resolve their disputes through bargaining and diplomacy, which are also less likely to harm their prestige in terms of reputational loss (Morris 2001). Loss of reputation in particular can have serious repercussion for the offending country, notably by making it more difficult to enter into agreements with other countries in the future (Guzman 2002). Loss of reputation is, according to Guzman (2002), an important reason why states usually refrain, in the first place, from including mandatory dispute settlement mechanisms in agreements. He reviewed 100 treaties listed in the United Nations Treaty Series from May 1998 that involve two or more states and found that 80 of these treaties did not provide for a mandatory dispute settlement mechanism and only 20 did (of these 20 treaties, 12 were bilateral investment treaties).

Besides the studies mentioned so far, several other publications have also sought to explain international treaty participation. But these studies explain treaty participation exclusively in terms of country characteristics such as the type of political regime and domestic political constraints, and in few cases also in terms of interdependent behavior, that is, how participation by one country or group of countries affects the behavior of other countries (Fredriksson and Gaston 2000; Neumayer 2002a, 2002b, 2008; Hathaway 2003; Roberts, Park and Vasquez 2004; Cole 2005; Fredriksson and Ujhelyi 2006; Goodliffe and Hawkins 2006; Vreeland 2008; Powell and Staton 2009; Wonik 2009;

Author). They do not take into account institutional design characteristics, nor do they address the more general issue of depth versus participation.

To summarize, the existing literature offers good reasons for assuming that the design of international agreements has important implications for the prospects of international cooperation once bargaining is over and countries need to decide whether they will formally accept and implement a given international agreement.³ The existing literature offers some very useful insights into particular facets of the larger depth versus participation issues. We believe, however, that sacrificing greater depth to obtain greater participation is a problematic strategy. In this paper we posit that such a sacrifice is not always required. Hence our argument partly cuts against the conventional depth versus participation perspective by arguing that even strongly legalized treaties, which mandate deep cooperation, can attract a large number of countries if they incorporate design elements that alleviate alleged high implementation costs and participants' loss of flexibility and sovereignty.

Our Argument

States design international agreements in response to specific problems, for instance problems pertaining to financial instability, trade protectionism, human rights violations, or environmental degradation. In doing so, they choose specific degrees of obligation, precision, and delegation they deem necessary in order to solve those problems. In most cases, they formally express these choices in international legal documents, primarily in the form of international treaties or similar documents, such as protocols, conventions, or memoranda of understanding. The legalization of international relations incurs costs. It requires concessions with respect to sovereignty and frequently also has financial implications. This raises the question of what motivates states to participate in international agreements in the first place.

Political science and international law scholars agree that states enter into legally binding agreements in order solve collective action problems and advance their mutual interests (Keohane 1984; Lipson 1991; Martin 1993; Abbott and Snidal 1998, 2000). Hence it appears like a paradox that greater participation in a given international agreement may be associated with less effective provisions.

We argue, however, that reducing the design characteristics of international agreements to variation along one single dimension, namely "depth", is too simple and potentially misleading. Some types of treaty design features, such as the degree and specificity of obligations and monitoring and enforcement, may well discourage countries from participating in a treaty and the international regime it constitutes. We submit, however, that other types of treaty design features can cut in the opposite direction and encourage participation. All these types of design features are expressions of the depth of international cooperation, even though they are likely to have different implications for

³ Note that ratification of a treaty is a voluntary act even if a country negotiated the treaty and voted in favor of its adoption. As Barrett (2003:93) puts it "...states are free to participate in a treaty or not as they please."

treaty participation. In any event, treaty design is likely to affect the incentives of countries to participate in any given cooperative effort, and even slight changes in institutional design may transform reluctant countries into willing participants. To obtain a better understanding of whether there is a depth versus participation dilemma we thus need to identify a generic set of important design characteristics of international institutions and also identify the implications of those design characteristics for participation.

We first turn to the specificity of obligations. International agreements may be very important for avoiding Pareto deficient outcomes, especially in situations where failure to cooperate would leave states exposed to important risks (for example, climate change) or would prevent them from realizing important benefits (for example, gains from free trade). Nevertheless, states often hesitate to commit to international agreements, notably those that involve high costs in financial terms or in terms of concessions with respect to national sovereignty. Specific obligations, for instance in the form of clear-cut quantitative targets expressed in international treaties, are an important manifestation of this type of institutional design features.

All other things being equal, international agreements with more specific obligations are likely to involve higher implementation costs as well as costs related to a loss of flexibility and thus also sovereignty. Implementation costs refers to whether and how much countries will have to change existing domestic policies, practices and laws in order to comply with the agreement.⁴ Loss of flexibility means that states face a loss in their ability to respond to unanticipated shocks as well as peculiar domestic circumstances without compromising the respective international agreement (Abbott and Snidal 2000; Koremenos 2005; von Stein 2008). Moreover, international agreements that require clearly visible, substantial changes in existing policies are likely to generate credibility and reputation costs if a country fails to fulfill or reneges on its obligations in the future (Martin 2000; Simmons 2000). More precise obligations also lead to more and better information with respect to the distributional effects of the respective international agreement. Hence they can generate distributional conflict among the countries involved in a cooperative effort and make participation in international agreements difficult (Goldstein and Martin 2000).

This suggests that if an international agreement creates no specific obligations, all participants in this agreement will easily be able to comply and participation should thus be high. Conversely, if obligations are specific and clearly expressed in the agreement then the distance between any country's current (or anticipated) policies and/or practices and legal commitments expressed in the agreement begins to matter. For these reasons we expect that, *ceteris paribus*, international agreements creating specific obligations are likely to attract fewer countries.

⁴ Hathaway (2003:1834) posits that "When deciding whether to ratify a treaty, a country will take into account the expected compliance costs – that is how much the country will change its behavior as a result of the ratification." Similarly, Helfer (2002:1852-1853) states that "Altering domestic policies to conform to international human rights standard is not costless. Such alternations impose external constraints on a government's ability to respond to legitimate social problems by regulating the behavior of individuals within its borders or by allocating resources to other areas of social policy-both traditional aspects of state sovereignty." See also Pae (2006) for an economic analysis of sovereignty costs associated with adhering to international human rights treaties.

In line with the literature on legalization we consider not only the specificity or precision of obligations, but also monitoring and enforcement. Because these mechanisms are primarily intended to deter or punish non-compliance we label them as “negative” compliance mechanisms. Although monitoring and enforcement mechanisms can help prevent opportunistic behavior, they are often perceived by states as a difficult to accept constraint on their autonomy and sovereignty. For instance, Goldstein and Martin (2000) examine the effect of WTO legalization on trade liberalization and argue that in light of uncertainty regarding the costs of trade agreements at the domestic level “... fully legalized procedures that apply high, deterministic penalties for non-compliance could backfire leading to an unraveling of the process of liberalization”(Goldstein and Martin 2000:621). Downs et al. (1996) also argue that states avoid agreements that have strong enforcement mechanisms.

In view of these arguments, we posit that countries regard both monitoring and enforcement mechanisms as limitations on their autonomy and sovereignty and thus as costly. All other things being equal, countries should, therefore, be more reluctant to participate in international agreements that provide for monitoring and/or enforcement mechanisms. We should also expect differences in participation rates depending on the combination of design features. Notably, participation should be most negatively affected by a combination of specific obligations and the existence of monitoring and enforcement mechanisms, and less so if only specific obligations but no monitoring and enforcement mechanisms are present.

As noted already further above the depth of cooperation may also be expressed in other types of institutional design features. Whereas the specificity of obligations, monitoring and enforcement are likely to have a limiting effect on participation, states often equip international institutions with additional key features. Three of these features, which we expect to have a participation-promoting effect, are dispute settlement mechanisms, assistance, and organizational structures.

States incorporate dispute settlement procedures (DSP) in some (but by no means all) agreements. Such procedures may involve a loss of policy discretion and control over potential future disputes, which is a typical delegation problem and may negatively affect participation (Morris 2001). We submit, however, that governments may still be willing to participate in agreements that incorporate dispute settlement procedures because such procedures equip them with ways and means of motivating other countries to comply with their obligations. When countries participate in an agreement that includes a dispute settlement procedure *ex ante*, they do not know with certainty that (*ex post*) they will not violate the treaty and that they will not be brought before a tribunal. Although this is a costly possibility, countries can also gain when other countries that are allegedly in violation of their commitments can be forced to submit to the same dispute settlement procedures. We argue that sovereignty concerns are already taken into account when countries decide on whether a given depth of cooperation, as expressed in obligations, monitoring, and enforcement, is acceptable. Hence we expect that international agreements including dispute settlement procedures are more attractive. The reason is that countries to whom a given level of obligation, monitoring, and enforcement is acceptable are likely to be interested in “tying other countries’ hands”.

Dispute settlement procedures (DSP) can, in addition, benefit states that seek to cooperate

with each other by providing new and unbiased information on relevant policies and practices of the participating countries (Smith 2000; Ginsburg and McAdams 2004).⁵ By discerning between real violations of the agreement and mistaken perceptions, DSP can identify violations of an agreement and bring them to the attention of all participants, thus exposing the offending country to a loss of reputation and helping to prevent cheating in the first place (Maggi 1999). Moreover, since governments cannot foresee all possible contingencies and are thus unable to define *ex ante* compliance, DSP can help clarify the meaning of ambiguous terms in the respective international agreement (Chayes and Chayes 1993) and contribute to developing new rules and applying existing rules to new or unanticipated circumstances (Posner and Yoo 2005). In most general terms, dispute settlement procedures can thus help increase transparency and reduce transaction costs, thereby facilitating and supporting cooperation (Smith 2000). Rosendorff (2005), for example, examines whether the inclusion of DSP affects the number of signatories in preferential trade agreements. Using Smith's data and measure of "legalism" of a dispute settlement system, he finds evidence that preferential trade agreements (PTAs) that include dispute settlement procedures are "more acceptable to a wider range of countries than agreements without DSP" (Rosendorff 2005:389).

Our arguments concerning the three participation-limiting design features, namely, obligations, monitoring and enforcement mechanisms, rest on the assumption that states are less willing to participate in international agreements they find costly to implement. It is quite possible, however, that overall incentive structures associated with an international agreement may change once other institutional design features such as side payments, technological assistance or other treaty membership benefits are added. Abbott and Snidal (1998), for instance, maintain that international organizations help less developed countries to acquire capacities that are deemed essential to both national policymaking and international activity. Barrett (2003:309) explains how excluding non-parties from treaty-based research and development enhances the incentives for states to ratify these treaties in order to acquire such knowledge. Author argues that developing countries with more involvement in international organizations are better able to take care of their natural environment because of the technological and financial assistance they receive through this involvement.

In light of these arguments we posit that granting financial, technical or other types of assistance is likely to help states comply with obligation contracted through the respective agreement. Assistance is, therefore, likely to promote participation. The Montreal Protocol for protecting the stratospheric ozone layer, for example, has established a multilateral fund to which industrialized countries contribute and from which developing countries and transition economies can receive assistance for phasing out ozone layer depleting chemicals. Similarly, the UN Convention on Biological Diversity offers support through the Global Environmental Facility (GEF) to facilitate implementation of treaty commitments in countries that encounter difficulties. Assistance provisions may, obviously, bear on cost/benefit calculations of states with respect to obligations and monitoring and enforcement. For instance, agreements with more specific

⁵ See Finlayson and Zacher 1981, Kovenock and Thursby 1994, Maggi 1999, and Rosendorff 2005 for analyses of the informational role of the WTO-Dispute Settlement Procedure. Keohane 1984, Oye 1986, and Martin 1993 emphasize the informational role of international institutions in general.

obligations are more likely to attract participation if they can offer assistance. Similarly, assistance may compensate for negative participation effects of monitoring and enforcement mechanisms.

Finally, international agreements quite often create treaty-specific secretariats or delegate tasks to existing international bodies (Abbott and Snidal 1998). Sandford (1994), for instance, notes that the most important tasks of such secretariats are: to help parties meet their commitments, and to prevent and manage implementation conflicts; to assist countries, especially developing nations, with capacity building; and to provide policy guidance. In many cases, secretariats also play a central role in coordinating and managing information flows. They coordinate and in some cases also standardize information collection by individual countries, and they are involved in information analysis and dissemination. Secretariats can also play an important role in assisting members with interpreting complex data and translating this information into policy advice. Governments of smaller countries, especially if they are economically weak, often lack the know-how and financial resources to develop the necessary expertise. Such countries in particular can benefit very much from services provided by international secretariats.

Another important task of secretariats is to assist member countries in preparing treaty-related conferences and associated negotiations and to provide them with logistical and administrative support for these. In doing so, secretariats can, to varying degrees, influence agenda-setting processes. Secretariats are, in many cases, also tasked to mobilize financial resources and technical expertise to support countries in implementing treaty commitments. Finally, secretariats may act as impartial intermediaries in an informal capacity and can serve as bridge builders in persuading states with differing or opposing points of view to sit at the same table and discuss policy-problems. For all these reasons we expect more participation in those international agreements that are equipped with secretariats.

In summary, we argue that a one-dimensional view of the depth versus participation problem is too simple and probably misleading, and that the depth of any given international cooperative effort is in fact multidimensional. This multidimensionality manifests itself in the design characteristics of international agreements. We submit that the specificity of obligations, monitoring and enforcement mechanisms, dispute settlement mechanisms, assistance, and organizational structures (secretariats) are institutional design features that are particularly important in terms of their implications for participation. We theorize that the first three of these design characteristics have negative and the latter three have positive effects on participation in international cooperative efforts.

Empirical Design

We test the above arguments on a dataset that includes information on ratifications as well as treaty characteristics of more than 200 global environmental agreements. In defining our sample of environmental agreements we rely on data provided by CIESIN

(2006) and Mitchell (2002-2008). We manually coded all agreements drawn from these sources to obtain information on the treaty characteristics of interest.

We have chosen global environmental agreements for two reasons. First, by restricting the analysis to one policy area we are able to limit unit-heterogeneity at least to some extent and are thus able to efficiently take care of remaining heterogeneity by means of a limited set of control variables. At the same time, there is sufficient variation on all key variables in the analysis. Second, our analysis requires a sample of treaties that can, in principle, attract participants (ratifying countries) from exactly the same population of countries in any given year. Global environmental treaties, which are open for ratification to all countries in the international system, meet this criterion and also meet our interest in obtaining a rather large sample (in our case 211 treaties).

Our dependent variable captures how many ratifications a given agreement has attracted by the end of our time period of analysis. Specifically, it is defined as the cumulated number of ratifications per global environmental agreement by the year 2006. This definition implies that the analysis is cross-sectional. The cross-sectional design is motivated by the fact that all of our key explanatory variables vary across treaties, but not across time or across countries.

The information on ratifications was retrieved from CIESIN (2006) and Mitchell (2002-2008). Our sample includes global environmental treaties and protocols to those treaties, but excludes amendments to treaties or protocols. For example, we include both the UN Framework Convention on Climate Change and the Kyoto Protocol. Protocols are usually not fully independent of treaties. However, there are sufficient institutional/design differences between the large majority of treaties and related protocols to warrant inclusion of both types in our sample. For example, the Vienna framework convention for protecting the stratospheric ozone layer does not include specific reduction targets for ozone depleting substances, and it does not provide for assistance; but the associated Montreal Protocol and its amendments include such measures. In contrast, amendments to treaties are often minor adjustments that in most cases do not introduce design modifications that would change the values on our institutional design variables. To examine whether our results are robust to potential problems associated with non-independent observations we run all statistical models with two samples, one that includes treaties and protocols ($n=211$), and one that includes only treaties ($n=143$). As shown in the descriptive statistics (see Appendix), the number of ratifications per treaty/protocol varies from 1 to 180.

Existing data on treaty characteristics, including those in the dataset of Mitchell (2002-2008), does not correspond closely enough to our theoretical arguments and concepts. Hence we coded the variables of interest by means of a content analysis of treaty texts. Coding instructions and the dataset are available from the authors on request.

Our independent variables are essentially coded as binary variables, indicating the presence or absence of a given treaty design characteristic. Conceptually, certain treaty design variables may exhibit more than binary variation. For instance, the precision of obligations could be conceptualized with a continuous scale. We thus started our data coding effort by allowing for more fine-grained categorizations for some of the explanatory variables. The coding process revealed, however, that the more fine-grained

categorizations are problematic. Most treaties in our sample could not be classified with the more fine-grained scales: we ended up with very few or no cases in many categories of non-binary scales, and the codings became much less reliable. In more general terms, this limitation is also due to the fact that, even though we are dealing with one policy area (environment), the more than 200 treaties in our sample are still quite heterogeneous. Hence there is no empirical benefit from using more fine-grained scales for the treaty design characteristics of interest in this paper because it would not make much sense to trade in data quality for more sophisticated scales.

Turning to each of the treaty characteristics, the explanatory variable *obligation* captures whether a treaty contains ambiguous or no specifications pertaining to standards or goals to be achieved, or whether it quantifies standards or goals, for example in the form of specific emission targets. It is coded 1 if the treaty includes specific quantitative targets and 0 otherwise.

Monitoring measures whether or not the treaty includes monitoring provisions. The variable *enforcement* indicates whether or not the treaty includes enforcement provisions.

The explanatory variable *dispute settlement* measures whether an agreement includes dispute settlement provisions. It is coded 1 if the respective agreement includes such provisions and 0 otherwise.

We measure *secretariat* with two dummy variables, one indicating whether a treaty establishes its own, treaty-specific secretariat, and the other indicating whether the treaty associates itself with an existing secretariat (for example, by delegating this task to the United Nations Environmental Program (UNEP)). For both dummy variables the baseline category (0) is a treaty without any secretariat.

Assistance captures whether member countries are to be granted technical and/or financial assistance to meet the treaty's goals. It is coded 1 if such assistance provisions are included in the treaty and 0 otherwise. Since international treaties often mandate preferential assistance for developing countries, we distinguish between assistance that is aimed at all treaty member states and assistance that is aimed only at developing countries.

We control for general environmental issue characteristics that may affect both treaty design characteristics and participation rates (ratification). *Global public good* indicates whether an agreement deals with a global public good or a national or sub-national public good. It is coded 1 if the treaty deals with internationally or globally shared natural resources or ecosystems, and 0 if there is explicit reference to national territory/waterways, domestic animals, etc. An additional variable deals with those agreements for which the distinction between international/global and domestic public goods is not sufficiently clear. This variable, *global/domestic public good*, is coded 1 if the distinction is difficult, and 0 for clearly domestic public goods. In line with the literature on global public goods (Barrett 2003.) we expect that the free-rider problem will make countries more reluctant to join agreements that seek to produce such international or global goods.

We also use several dummy variables to control for specific issue areas treaties deal with. In particular, we include dummies for the following issue areas: *pollution*, *species*,

nuclear, and *habitat*. Treaties dealing with agricultural issues serve as the baseline category.

Descriptive statistics and binary correlations are shown in Tables A.1, A.2 and A.6 of the Appendix.

Since we are dealing with count data (number of countries that have ratified a given treaty by the end of the period of analysis) we assume a negative binomial process with the number of years a treaty has been open for ratification as exposure time. The latter means that we control for the fact that treaties that were concluded earlier have had more time to attract ratifications. We use the negative binomial rather than a poisson specification because of overdispersion.

Results

We begin with a discussion of the main results. We then examine how different combinations of our independent variables affect ratification rates and also discuss the robustness of the results.

Main Results

Table 1 displays the main results. The second column reports the negative binomial coefficients (β). Column three shows the exponent of these coefficients ($\exp(\beta)$) and the last column indicates percentage changes to facilitate quantitative interpretation.

Insert Table 1 about here

Overall, we find only little support for the “depth versus participation” claim. Although the coefficient on the specificity of obligations variable (*obligation*) is negative and statistically significant, the coefficients on both the monitoring and enforcement variables do not reach standard significance levels and point in the opposite direction. This finding suggests that more demanding treaties, in the sense that they incorporate specific targets do indeed reduce the number participating countries. However, the inclusion of monitoring and enforcement mechanisms does not seem to further discourage ratification. The argument that states refrain from joining agreements they find costly to implement is thus only partially supported. Whereas states seem to perceive precise targets as a ratification hurdle, this is not the case for the mechanisms – monitoring and enforcement – meant to deter or identify and punish non-compliance.

In line with our theoretical argument, treaties that include a dispute settlement mechanism attract a larger number of countries than treaties without such a mechanism. As shown in Table 1, the inclusion of a dispute settlement mechanism increases the ratification rate by around 29%. This finding is in line with our theoretical argument that dispute settlement mechanisms increase transparency by providing information, reducing

transaction costs, and allowing a country to “tie other countries’ hands.”

Our argument that positive incentives, such as the granting of technical and/or financial assistance, foster ratification receives strong support. The coefficients on both assistance to all countries and assistance to developing countries are positive and highly significant. The effect is also very strong in substantive terms. General assistance increases participation by 79% and assistance to developing countries increases participation by 648%.

In contrast to our theoretical argument, the ratification propensity for treaties with their own secretariat is 34% lower than for treaties without any secretariat. This finding challenges the argument that treaty specific secretariats are valuable to member countries because they provide information and policy advice and assist countries in meeting their obligations. One possible explanation for the negative and statistically significant coefficient of the secretariat variable could be that agreements establishing a new secretariat are also agreements with a more ambitious agenda and are therefore more burdensome for countries. This interpretation is in line with the main argument of the depth-versus-participation perspective, which posits that more demanding treaties discourage ratification.

It is important to keep in mind that the coding of treaty characteristics is binary. Hence the results capture *relative* differences between treaties. For instance, while none of the assistance provisions in the 200 treaties examined may be very ambitious (in some sense of that term), we do find that treaties with some specific assistance provisions attract more countries. Similarly, none of the treaties in our sample may have very strong enforcement mechanisms. We do find, however, that those treaties with some form of enforcement mechanism do not attract fewer countries than treaties without any kind of enforcement mechanism.

The control variables behave largely as expected. Agreements dealing with global public goods attract fewer countries, compared to agreements dealing with local public goods. The coefficients of both indicators for public goods are negative and statistically significant. Agreements dealing with global public goods are around 45% less likely to be ratified. With regard to issue areas, agreements on pollution, species and habitat appear to be less attractive than other agreements.

Regarding the appropriateness of the negative binomial model, alpha is statistically significantly larger than zero. We thus have to reject the null hypothesis of no over-dispersion. This implies that the negative binomial rather than a simple poisson model is the adequate model specification.

Combined Effects of Independent Variables

To illustrate how different combinations of our independent variables affect ratification behavior, Tables 2 and 3 show the number of ratifications our regression model predicts for certain combinations of institutional design features as manifest in some well-known global environmental treaties. Such analysis is interesting because, for instance, the effects of the specificity of obligations and monitoring and enforcement might be mutually reinforcing. That is, monitoring and enforcement of obligations, to the extent

the latter are specific, are likely to generate higher implementation costs and higher non-compliance costs for countries that join the respective treaty. In contrast, those costs are likely to be smaller for agreements with specific obligations but no monitoring and enforcement mechanisms. Similarly, the specificity of obligations and assistance could be important in combination because assistance could offset the costs imposed by specific treaty obligations.

Insert Tables 2 and 3 about here

For the purpose of this analysis we focus on several well-known global environmental treaties. We set all independent and control variables to the values for the respective treaty and show both our predictions and the actual ratification rates for these treaties. We opt for this approach because all independent variables need to be set to a specific value in order to obtain predicted values for the dependent variable.

With respect to different combinations of monitoring, enforcement and specificity of obligations we do not observe a negatively reinforcing effect. Both the Kyoto Protocol and especially the Protocol on Substances that Deplete the Ozone Layer are characterized by a relatively high number of predicted ratifications, despite combining specific obligations with monitoring and enforcement mechanisms. Similarly, the United Nations Convention on the Law of the Sea and the International Convention to Combat Desertification are characterized by a high number of predicted ratifications, although they combine monitoring provisions with specific obligations. In contrast, the Convention on the High Seas and the Convention on the Conservation of Migratory Species come with a relatively low number of predicted ratifications, although both of them contain neither specific obligations nor enforcement provisions. Consequently, our data does not support the prediction that specific obligations combined with monitoring and enforcement provisions reduce the ratification rate.

Interestingly, we observe that all treaties mandating assistance to developing countries are characterized by a rather high number of predicted ratifications, independently of whether they also contain specific obligations or not (Table 2). This result lends some support to the conjecture that assistance may indeed offset costs imposed by specific treaty obligations.

Concerning the fit of our model more generally, we observe that in most cases, such as the Convention on the High Seas, the International Convention for the Regulation of Whaling, and the Protocol on Substances that Deplete the Ozone Layer, the predicted number of ratifications is very close to the actual number of ratifications. However, in some cases our predictions deviate from the actual number of ratifications. Examples are the United Nations Framework Convention on Climate Change (UNFCCC), for which we predict ratification by 118 countries, whereas in reality 170 countries have ratified, and the Kyoto Protocol, for which we predict 64 ratifications, whereas in reality 109 countries have ratified. One reason for underestimating ratifications in those two cases is that these agreements deal with a global public good. Treaties dealing with global public goods are, according to theory and in correspondence with our models shown in Table 1, ratified by

fewer countries. Nonetheless, both the UNFCCC and the Kyoto Protocol have reached high popularity, which makes them exceptional and arguably accounts for the deviation between the actual and predicted ratification number.⁶

Robustness of Results and Discussion

The results discussed so far are based on the sample including both “stand-alone” global environmental agreements and related protocols (but excluding amendments). Table A.3 in the Appendix shows that our main results are robust to the exclusion of protocols, which may not be independent of the respective main agreement. The only exceptions are the coefficients on the secretariat variable and the two control variables for mixed public goods and habitat, which become insignificant (but do not change signs) when protocols are excluded. This might be due to the smaller sample size.

In addition to excluding all protocols from the analysis, we examined the robustness of our results by including additional treaty design characteristics and by disaggregating the dispute mechanism variable. In principle, a plethora of different treaty characteristics exist. From a theoretical standpoint, however, it is not evident that the inclusion of any of these additional characteristics is warranted. Nonetheless, as a robustness check we introduce two further treaty characteristics that have received some attention in the existing literature. These characteristics are voting rules and whether a treaty provides for regular meetings.

Assuming that countries join international treaties to advance their own interests they should be concerned with the formal voting procedures treaty members use to reach decisions. Whereas unanimity voting implies that decisions can only be taken with the endorsement of all members, that is, every member has veto power, majority voting prevents individual member countries from blocking a decision. Unlike unanimity, under majority rule no single country has a significant formal capacity to block or prevent a proposed measure. Majority voting should, therefore, entail a greater loss of sovereignty over treaty-related decisions than unanimity voting. Accordingly, we should expect countries to be more willing to join agreements that provide for unanimity rule.

Treaties also differ with regard to whether they require regular meetings of member states. Holding meetings involves transaction costs in the form of coordinating the members to the treaty, arranging for a time and place, taking decisions, etc. Treaties mandating regular meetings are thus likely to be more demanding, which in turn may have negative implications for participation.

We examine these additional arguments relating to treaty design by introducing two design variables. *Unanimity* voting takes the value 1 if decisions in the highest treaty-related body are taken by unanimity, and 0 otherwise. Similarly, *meetings* is a dummy variable indicating whether or not an agreement requires regular meetings of its member states.

As Table A.4 in the Appendix shows the coefficient on unanimity voting is negative but

⁶ In fact, if we calculate the predicted number of ratifications for both treaties while setting the value of global public goods to zero, our model predicts a considerably higher number of ratifications.

not statistically significant. This result is surprising, given that unanimity voting imposes fewer constraints on countries' sovereignty. Although the coefficient on meetings is negative, which is in line with the interpretation that treaties with meetings are more demanding, it does not reach statistical significance either.

Our main results rely on binary coding of treaty design characteristics. As discussed at the beginning of the empirical section, using a more fine-grained scale for measurement of treaty design characteristics would create serious reliability problems. The main exception is the variable for dispute settlement mechanisms, for which we can provide a disaggregation of the original, binary variable. Specifically, we distinguish between three categories of dispute settlement: highly elaborated dispute settlement mechanisms that are institutionalized within the treaty (*dispute, elaborated*)⁷, those that are part of the treaty framework, but only on an ad hoc basis (*dispute, ad hoc*), and those that delegate dispute settlement to a treaty-external institution (*dispute, delegated*); with no dispute settlement provisions serving as the baseline category.

Interestingly, the effect of the dispute settlement mechanism varies according to the type of such mechanism set up by a treaty. The existence of provisions delegating dispute settlement to bodies outside the respective treaty (such as the International Court of Justice) increases the ratification rate significantly. Similarly, provisions for ad hoc dispute settlement procedures within a treaty also increase the ratification rate, though this effect does not reach statistical significance. Such ad-hoc provisions usually hold that countries, in case of a dispute, should find a mutually acceptable solution, but do not specify in detail what mechanisms should be used to that end. These findings support the argument that dispute settlement mechanisms help in reducing ambiguity by clarifying treaty rules and providing relevant information, and hence they are attractive to countries. Surprisingly, however, the existence of elaborate dispute settlement procedures inside a treaty does not have a statistically significant effect. We interpret these findings in the sense that the presumably somewhat weaker dispute settlement mechanisms promote participation, whereas the more complex and presumably more costly mechanisms of this kind do not deter participation.

Another, quite fundamental, conceptual challenge to our findings could be that international agreements are, a priori, designed in ways that accommodate most countries interests. In the most extreme case, treaties may simply reflect lowest common denominator bargaining outcomes. If this were the case, our empirical approach might produce biased estimates because we have not explicitly accounted for the factors that lead to specific bargaining outcomes and how those outcomes then influence ratification behavior. We do not know of any large-N empirical work that includes both the bargaining and ratification process in one model. We submit, however, that our results are unlikely to be biased for at least two reasons.

First, if international agreements were, as the neo-realist perspective on international politics tends to argue, only "frozen interests", we should not observe such strong variation in ratification behavior across agreements (see descriptive statistics in the Appendix). In other words, if negotiators were willing and able to design treaties so that

⁷ For example, the Convention on the Prevention of Marine Pollution from Land-Based Sources includes very detailed dispute settlement provisions.

these treaties accommodate most or even all potential member countries' (and also legislatures') interests, we should see only little or even no variation in ratification rates between different treaties. In most international negotiations we know of, a large majority or even all bargaining parties must accept, adopt or sign a treaty text before the ratification phase can begin. If the bargaining process thus acted as an effective filter through which only those agreements acceptable to the large majority of negotiating countries could pass why do not all treaties that make it through this filter eventually attract the same or a very similar number of countries? Following a similar logic we should not observe statistically significant and substantively important effects of some of our institutional design variables if variation in ratification rates across treaties were driven primarily by factors that determine bargaining outcomes.

Second, neo-realist scholars will probably argue that bargaining outcomes are unlikely to be congruent with every participant country's preferences (see first point), but are more likely to correspond to what powerful countries want. That is, less powerful countries may accept bargaining outcomes and thereby allow for the ratification phase to begin, but only because of political or other types of pressure by more powerful countries. The empirical implication of this argument is that, to the extent more powerful countries are more likely to obtain the bargaining outcomes they want, they should be more likely to ratify international agreements in whose negotiation they have participated.

In most general terms, the two aforementioned points also imply that the coefficients in our models could be biased if we did not control for variables that could influence both the bargaining and the ratification outcome. Power, political regime type, and level of development (income) are arguably the most important candidate variables of this kind. Hence, we examine the possibility that the effect of our treaty design variables is conditional on countries' power, regime type, or income. To that end, we estimate our model for ten different samples, split according to a country's population or income, two distinct proxies for power and capacity, and according to whether the country is a democracy or an autocracy. By considering the number of ratifications for different groups of countries (for example, the top 10% in terms of income), we control for whether the coefficients change when looking at specific subgroups of countries only. If the results differed significantly across sub-samples this could indicate that specific types of countries may have obtained systematically better (or worse) bargaining outcomes.

Tables A.5 and A.6 (in the Appendix) show that our main findings survive in the different sub-samples. This result supports the conclusion that some treaty design characteristics are indeed important determinants of ratification behavior. This assumption is also supported by Table A.7 in the Appendix, which shows the correlations between ratification rates in the different sub-samples. Table A.7 indicates that ratification rates in the various income and population groups as well as between democracies and autocracies are highly correlated. That is, the effects of our treaty design variables on ratification behavior do not vary much between more and less powerful (in terms of population and income) and between democratic and non-democratic countries.

Conclusion

The formation of international regimes via international treaties is not complete when formal international bargaining comes to an end. International cooperation can only get off to an effective start once bargaining outcomes, notably those materializing in the form of a treaty, are ratified by the negotiators' home countries. While most of the existing literature on the formation of international treaties concentrates on the negotiation process as well as treaty compliance and effectiveness, we focus on the ratification stage. The simple reason is that ratification is a key prerequisite for treaty compliance, effectiveness, and thus ultimately successful international problem solving. In particular, we examine whether treaty design features that are expected to increase the depth of cooperation among countries affect participation in those treaties.

We argue that some treaty design features aimed at increasing the depth of cooperation, such as clearly stated targets, monitoring, and enforcement mechanisms should decrease treaty participation mainly because of implementation costs and loss of sovereignty concerns. Moreover, we argue that "positive" compliance mechanisms aimed at clarifying and facilitating the implementation of treaty rules, such as dispute settlement mechanisms and technical and financial assistance, which are also expressions of the depth of cooperation, should have a positive effect on treaty participation.

We assess these theoretical arguments using a dataset that covers more than 200 global environmental treaties since 1950. We find only little support for the argument that more demanding treaties attract fewer countries. By implication, we find only very limited evidence for a depth versus participation dilemma in global environmental cooperation. To the contrary, our results show that treaties with assistance provisions and dispute settlement mechanisms are more attractive.

Of course, we cannot exclude the possibility that some of the toughest problems are kept off the international agenda, or that negotiations fail to produce treaties in such cases. Since our analysis focuses on the ratification phase of international cooperation, we cannot rule out that such difficulties exist at the bargaining stage. It is quite possible, therefore, that some form of depth versus participation dilemma exists when the global political agenda is set and bargaining takes place. Nevertheless, once the ratification stage is reached our results leave considerable room for optimism regarding the prospects for global environmental cooperation.

Our optimism is based on the presumed rational behavior of states. Given that countries do not appear to stay away from treaties that mandate deeper cooperation, as shown by our analysis, particular treaty designs, such as treaties including dispute settlement mechanisms, can foster cooperation. The main reason is that such mechanisms carry the potential of enticing hesitant countries to participate by decreasing uncertainty surrounding the behavior of other states. In addition, financial, technical or other types of assistance that help countries, especially less developed ones, implement treaty obligations can serve as an important tool for securing ratification and thus taking an important step toward solving international problems. The very strong global participation in the Montreal Protocol for protecting the stratospheric ozone layer, for example, can to a considerable degree be attributed to very substantive assistance

mechanisms in that protocol and its amendments. Recent rounds of negotiation on climate change mitigation, such as the Copenhagen conference, have also made it very clear that a strong assistance mechanism will be required to achieve greater commitment from developing countries.

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TABLE 1. Main Results

| | <i>Coefficient β</i> | <i>Exp(β)</i> | <i>%</i> |
|-----------------------------|---------------------------------------|--------------------------------|----------|
| Obligations | -0.36 (0.17)** | 0.70 | -30.0 |
| Monitoring | 0.06 (0.18) | 1.06 | 5.7 |
| Enforcement | 0.06 (0.16) | 1.06 | 6.0 |
| Assistance, all | 0.58 (0.22)*** | 1.80 | 79.1 |
| Assistance, developing | 2.01 (0.22)*** | 7.48 | 648.2 |
| Dispute settlement | 0.25 (0.08)* | 1.29 | 28.9 |
| Own secretariat | -0.42 (0.21)** | 0.66 | -34.3 |
| Existing secretariat | -0.17 (0.19) | 0.84 | -15.8 |
| Global public good | -0.60 (0.18)*** | 0.55 | -44.9 |
| Global/domestic public good | -0.54 (0.28)* | 0.59 | -41.9 |
| Pollution | -0.29 (0.17)* | 0.75 | -25.4 |
| Species | -0.56 (0.17)*** | 0.57 | -43.0 |
| Nuclear | -0.06 (0.22) | 0.94 | -5.7 |
| Habitat | -0.41 (0.16)** | 0.67 | -33.3 |
| Constant | 1.12 (0.26)*** | | |
| Alpha | 0.80 (.07)*** | | |
| Observations | 211 | | |
| Log likelihood | -890.50 | | |
| LR chi2(11) | 139.09 | | |
| Prob > chi2 | 0.00 | | |

(Notes. Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%)

TABLE 2. Combinations of Certain Treaty Characteristics

| | <i>United Nations Framework Convention on Climate Change</i> | <i>Kyoto Protocol To The United Nations Framework Convention On Climate Change</i> | <i>International Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification</i> | <i>Protocol on Substances that Deplete the Ozone Layer</i> | <i>United Nations Convention on the Law of the Sea</i> |
|-----------------------------|--|--|--|--|--|
| Predicted ratifications | 118 | 64 | 106 | 145 | 95 |
| Actual ratifications | 170 | 109 | 161 | 164 | 115 |
| Obligations | 0 | 1 | 1 | 1 | 1 |
| Monitoring | 1 | 1 | 1 | 1 | 1 |
| Enforcement | 0 | 1 | 0 | 1 | 0 |
| Assistance, all | 0 | 0 | 0 | 0 | 0 |
| Assistance, developing | 1 | 1 | 1 | 1 | 1 |
| Dispute settlement | 1 | 1 | 1 | 1 | 1 |
| Own secretariat | 1 | 0 | 1 | 0 | 1 |
| Existing secretariat | 0 | 1 | 0 | 1 | 0 |
| Global public good | 1 | 1 | 0 | 1 | 1 |
| Global/domestic public good | 0 | 0 | 0 | 0 | 0 |
| Pollution | 1 | 1 | 0 | 1 | 1 |
| Species | 0 | 0 | 0 | 0 | 0 |
| Nuclear | 0 | 0 | 0 | 0 | 0 |
| Habitat | 0 | 0 | 1 | 0 | 0 |

TABLE 3. Combinations of Certain Treaty Characteristics

| | <i>Convention on the High Seas</i> | <i>International Convention for the Prevention of Pollution from Ships (MARPOL)</i> | <i>International Convention for the Regulation of Whaling</i> | <i>Convention on the Conservation of Migratory Species of Wild Animals</i> |
|-----------------------------|--|---|---|--|
| Predicted ratifications | 56 | 56 | 28 | 28 |
| Actual ratifications | 59 | 26 | 32 | 59 |
| Obligations | 0 | 1 | 1 | 0 |
| Monitoring | 0 | 1 | 1 | 1 |
| Enforcement | 0 | 0 | 0 | 0 |
| Assistance, all | 0 | 1 | 0 | 0 |
| Assistance, developing | 0 | 0 | 0 | 0 |
| Dispute settlement | 0 | 1 | 0 | 1 |
| Own secretariat | 0 | 0 | 1 | 0 |
| Existing secretariat | 0 | 1 | 0 | 1 |
| Global public good | 1 | 1 | 1 | 1 |
| Global/domestic public good | 0 | 0 | 0 | 0 |
| Pollution | 1 | 1 | 0 | 0 |
| Species | 0 | 0 | 1 | 1 |
| Nuclear | 0 | 0 | 0 | 0 |
| Habitat | 0 | 0 | 1 | 0 |

Appendix

TABLE A.1. Summary Statistics

| <i>Variable</i> | <i>Obs</i> | <i>Mean</i> | <i>Std. Dev.</i> | <i>Min</i> | <i>Max</i> |
|-----------------------------|------------|-------------|------------------|------------|------------|
| Number of ratifications | 211 | 31.55 | 39.98 | 1 | 180 |
| Obligations | 211 | .76 | .43 | 0 | 1 |
| Monitoring | 211 | .70 | .46 | 0 | 1 |
| Enforcement | 211 | .31 | .46 | 0 | 1 |
| Assistance, all | 211 | .11 | .31 | 0 | 1 |
| Assistance, developing | 211 | .12 | .32 | 0 | 1 |
| Dispute settlement | 211 | .57 | .50 | 0 | 1 |
| Own secretariat | 211 | .30 | .46 | 0 | 1 |
| Existing secretariat | 211 | .45 | .50 | 0 | 1 |
| Global public good | 211 | .70 | .46 | 0 | 1 |
| Global/domestic public good | 211 | .09 | .28 | 0 | 1 |
| Pollution | 211 | .45 | .50 | 0 | 1 |
| Species | 211 | .35 | .48 | 0 | 1 |
| Nuclear | 211 | .14 | .35 | 0 | 1 |
| Habitat | 211 | .24 | .43 | 0 | 1 |

TABLE A.2. Frequencies

| | | <i>Frequency</i> | <i>Percent</i> |
|-----------------------------|---|------------------|----------------|
| Obligations | 0 | 51 | 24.17 |
| | 1 | 160 | 75.83 |
| Monitoring | 0 | 64 | 30.33 |
| | 1 | 147 | 69.67 |
| Enforcement | 0 | 146 | 69.19 |
| | 1 | 65 | 30.81 |
| Assistance, all | 0 | 188 | 89.10 |
| | 1 | 23 | 10.90 |
| Assistance, developing | 0 | 186 | 88.15 |
| | 1 | 25 | 11.85 |
| Dispute settlement | 0 | 91 | 43.13 |
| | 1 | 120 | 56.87 |
| Own secretariat | 0 | 147 | 69.67 |
| | 1 | 64 | 30.33 |
| Existing secretariat | 0 | 117 | 55.45 |
| | 1 | 94 | 44.55 |
| Global public good | 0 | 64 | 30.33 |
| | 1 | 147 | 69.67 |
| Global/domestic public good | 0 | 193 | 91.47 |
| | 1 | 18 | 8.53 |
| Pollution | 0 | 116 | 54.98 |
| | 1 | 95 | 45.02 |
| Species | 0 | 137 | 64.93 |
| | 1 | 74 | 35.07 |
| Nuclear | 0 | 181 | 85.78 |
| | 1 | 30 | 14.22 |
| Habitat | 0 | 160 | 75.83 |
| | 1 | 51 | 24.17 |

TABLE A.3. Main Results, Excluding Protocols

| | <i>Coefficient β</i> |
|-----------------------------|---------------------------------------|
| Obligations | -0.39 (0.18)** |
| Monitoring | 0.20 (0.18) |
| Enforcement | -0.14 (0.20) |
| Assistance, all | 0.76 (0.26)*** |
| Assistance, developing | 2.09 (0.28)*** |
| Dispute settlement | 0.36 (0.16)** |
| Own secretariat | -0.28 (0.22) |
| Existing secretariat | -0.10 (0.21) |
| Global public good | -0.66 (0.19)*** |
| Global/domestic public good | -0.21 (0.37) |
| Pollution | -0.36 (0.19)* |
| Species | -0.62 (0.20)*** |
| Nuclear | -0.05 (0.23) |
| Habitat | -0.27 (0.18) |
| Constant | 0.95 (0.27)*** |
| Alpha | 0.68 (0.08)*** |
| Observations | 143 |
| Log likelihood | -611.06 |
| LR Chi2(11) | 118.46 |
| Prob > chi2 | 0.00 |

(Notes: Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%)

TABLE A.4. Robustness Checks

| | <i>Coefficient β</i> | <i>Coefficient β</i> |
|-----------------------------|---------------------------------------|---------------------------------------|
| Obligations | -0.33* (0.18) | -0.31* (0.17) |
| Monitoring | 0.08 (0.18) | 0.03 (0.17) |
| Enforcement | 0.06 (0.16) | 0.03 (0.16) |
| Assistance, all | 0.55** (0.23) | 0.67*** (0.22) |
| Assistance, developing | 1.98*** (0.23) | 1.85*** (0.22) |
| Dispute settlement | 0.28* (0.15) | |
| Dispute, delegated | | 0.65*** (0.17) |
| Dispute, ad hoc | | 0.29 (0.23) |
| Dispute, elaborated | | -0.12 (0.21) |
| Own secretariat | -0.32 (0.25) | -0.57*** (0.21) |
| Existing secretariat | -0.09 (0.23) | -0.28 (0.19) |
| Unanimity voting | -0.06 (0.16) | |
| Meetings | -0.15 (0.22) | |
| Global public good | -0.59*** (0.18) | -0.64*** (0.18) |
| Global/domestic public good | -0.55* (0.29) | -0.46 (0.28) |
| Pollution | -0.29* (0.17) | -0.20 (0.17) |
| Species | -0.57*** (0.17) | -0.51*** (0.17) |
| Nuclear | -0.08 (0.22) | -0.12 (0.21) |
| Habitat | -0.41** (0.16) | -0.32* (0.16) |
| Constant | 1.13*** (0.26) | 1.02*** (0.24) |
| Alpha | 0.79 (0.07)*** | 0.75 (0.07)*** |
| Observations | 211 | 213 |
| Log likelihood | -890.2 | -891.6 |
| LR Chi2(11) | 139.7 | 154.7 |
| Prob > Chi2 | 0.00 | 0.00 |

(Notes: Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%)

TABLE A.5: Results for Different Samples

| | <i>10 % least populous countries</i> | <i>10 % most populous countries</i> | <i>80 % in the middle</i> | <i>25 % least populous countries</i> |
|------------------------------|--|---|-----------------------------------|--|
| Obligations | -0.35 (0.26) | -0.57*** (0.19) | -0.30* (0.18) | -0.47** (0.23) |
| Monitoring | -0.00 (0.28) | 0.21 (0.20) | -0.01 (0.18) | 0.02 (0.24) |
| Enforcement | -0.01 (0.27) | -0.00 (0.19) | -0.02 (0.17) | 0.13 (0.22) |
| Assistance, all | 0.54 (0.35) | 0.72*** (0.25) | 0.54** (0.23) | 0.48 (0.30) |
| Assistance, developing | 2.44*** (0.35) | 1.89*** (0.25) | 1.94*** (0.23) | 2.32*** (0.29) |
| Dispute settlement | 0.12 (0.24) | 0.02 (0.17) | 0.38** (0.15) | 0.23 (0.20) |
| Own secretariat | -0.99*** (0.34) | -0.41* (0.23) | -0.38* (0.22) | -0.61** (0.29) |
| Existing secretariat | -0.33 (0.30) | -0.33 (0.21) | -0.15 (0.20) | -0.16 (0.26) |
| Global public goods | -0.60** (0.30) | -0.54*** (0.21) | -0.65*** (0.19) | -0.66*** (0.25) |
| Global/domestic public goods | -0.07 (0.45) | -0.66* (0.35) | -0.69** (0.29) | -0.20 (0.38) |
| Pollution | -0.39 (0.27) | -0.16 (0.19) | -0.28 (0.17) | -0.36 (0.23) |
| Species | -1.00*** (0.28) | -0.17 (0.19) | -0.56*** (0.18) | -0.96*** (0.24) |
| Nuclear | -0.41 (0.33) | 0.18 (0.24) | -0.02 (0.22) | -0.28 (0.29) |
| Habitat | -0.55** (0.27) | -0.38* (0.20) | -0.50*** (0.17) | -0.36 (0.22) |
| Constant | -1.06*** (0.40) | -1.06*** (0.30) | 0.83*** (0.27) | -0.29 (0.35) |
| Alpha | 1.38 (0.22)*** | 0.73 (0.11)*** | 0.83 (0.08)*** | 1.24 (0.15)*** |
| Observations | 211 | 211 | 211 | 211 |
| Log likelihood | -380.9 | -473.1 | -830.9 | -551.8 |
| LR Chi2(11) | 74.18 | 87.67 | 133.0 | 101.3 |
| Prob > Chi2 | 0.00 | 0.00 | 0.00 | 0.00 |

(Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1)

TABLE A.6. Results for Different Samples

| | <i>10 % poorest countries</i> | <i>10 % richest countries</i> | <i>80 % in the middle</i> | <i>25 % poorest countries</i> | <i>Democra- cies</i> | <i>Autocracies</i> |
|---------------------------------|---------------------------------------|---------------------------------------|-----------------------------------|---------------------------------------|--------------------------|--------------------|
| Obligations | -0.51 (0.38) | -0.21 (0.23) | -0.38** (0.18) | -0.47 (0.36) | -0.30 (0.19) | -0.42 (0.28) |
| Monitoring | 0.30 (0.45) | -0.04 (0.23) | -0.01 (0.18) | 0.08 (0.41) | -0.01 (0.20) | 0.14 (0.30) |
| Enforcement | -0.34 (0.41) | 0.21 (0.22) | 0.01 (0.17) | -0.39 (0.39) | 0.15 (0.18) | -0.41 (0.28) |
| Assistance, all | 1.09** (0.54) | 0.28 (0.29) | 0.63*** (0.23) | 1.12** (0.51) | 0.52** (0.25) | 1.05*** (0.37) |
| Assistance, developing | 3.21*** (0.51) | 1.26*** (0.29) | 2.07*** (0.23) | 3.11*** (0.50) | 1.80*** (0.25) | 2.65*** (0.36) |
| Dispute settlement | 0.36 (0.41) | 0.14 (0.19) | 0.31** (0.15) | 0.60 (0.38) | 0.17 (0.16) | 0.65** (0.26) |
| Own secretariat | -0.99** (0.48) | -0.39 (0.28) | -0.40* (0.22) | -0.82* (0.44) | -0.39* (0.24) | -0.62* (0.34) |
| Existing secretariat | -0.81* (0.43) | -0.07 (0.25) | -0.18 (0.20) | -0.71* (0.41) | -0.10 (0.21) | -0.61* (0.32) |
| Global public goods | -0.80* (0.41) | -0.48** (0.24) | -0.65*** (0.19) | -0.84** (0.39) | -0.55*** (0.21) | -0.75** (0.30) |
| Global/domestic public goods | -0.07 (0.67) | -0.48 (0.38) | -0.59** (0.29) | -0.35 (0.63) | -0.46 (0.31) | -0.79* (0.47) |
| Pollution | -0.36 (0.36) | -0.27 (0.22) | -0.29* (0.17) | -0.47 (0.35) | -0.35* (0.19) | -0.14 (0.26) |
| Species | -0.38 (0.43) | -0.59*** (0.23) | -0.55*** (0.18) | -0.34 (0.41) | -0.59*** (0.19) | -0.32 (0.30) |
| Nuclear | 0.21 (0.48) | -0.17 (0.28) | 0.00 (0.22) | 0.36 (0.45) | -0.11 (0.24) | 0.33 (0.34) |
| Habitat | -0.19 (0.41) | -0.48** (0.21) | -0.45*** (0.17) | -0.23 (0.38) | -0.43** (0.18) | -0.58** (0.27) |
| Constant | -1.92*** (0.59) | -0.47 (0.35) | 0.80*** (0.27) | -0.96* (0.56) | 0.83*** (0.30) | -0.47 (0.41) |
| Alpha | 3.10 (0.57)*** | 1.8 (0.15)*** | 0.82 (0.08)*** | 3.27 (0.46)*** | 0.99 (0.10)*** | 1.91 (0.23)*** |
| Observations | 211 | 211 | 211 | 211 | 211 | 211 |
| Log likelihood | -292.5 | -578.0 | -812.3 | -420.5 | -827.7 | -568.0 |
| LR Chi2(11) | 59.33 | 44.91 | 140.5 | 66.25 | 96.22 | 96.43 |
| Prob > Chi2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

(Notes: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1)

TABLE A.7. Correlation Between Ratifications in Different Subsamples

| | <i>all countries</i> | <i>10% least populous countries</i> | <i>10% most populous countries</i> | <i>80% in the middle</i> | <i>25% least populous countries</i> | <i>10% poorest countries</i> | <i>10% richest countries</i> | <i>80% in the middle</i> | <i>25% poorest countries</i> | <i>Democ- racies</i> | <i>Auto- cracies</i> |
|------------------------------|--------------------------|---|--|----------------------------------|---|--------------------------------------|--------------------------------------|----------------------------------|--------------------------------------|--------------------------|--------------------------|
| All countries | 1.00 | | | | | | | | | | |
| 10% least populous countries | 0.92 | 1.00 | | | | | | | | | |
| 10% most populous countries | 0.91 | 0.80 | 1.00 | | | | | | | | |
| 80% in the middle | 0.996 | 0.90 | 0.90 | 1.00 | | | | | | | |
| 25% least populous countries | 0.97 | 0.96 | 0.85 | 0.96 | 1.00 | | | | | | |
| 10% poorest countries | 0.90 | 0.82 | 0.78 | 0.89 | 0.90 | 1.00 | | | | | |
| 10% richest countries | 0.82 | 0.76 | 0.79 | 0.83 | 0.75 | 0.58 | 1.00 | | | | |
| 80% in the middle | 0.996 | 0.91 | 0.92 | 0.99 | 0.97 | 0.89 | 0.79 | 1.00 | | | |
| 25% poorest countries | 0.91 | 0.83 | 0.79 | 0.91 | 0.91 | 0.99 | 0.59 | 0.91 | 1.00 | | |
| Democracies | 0.98 | 0.90 | 0.91 | 0.98 | 0.94 | 0.83 | 0.89 | 0.98 | 0.84 | 1.00 | |
| Autocracies | 0.95 | 0.90 | 0.86 | 0.94 | 0.95 | 0.95 | 0.65 | 0.95 | 0.96 | 0.88 | 1.00 |

TABLE A.8. BINARY CORRELATIONS

| | <i>Number of ratifications</i> | <i>Obligations</i> | <i>Monitoring</i> | <i>Enforcement</i> | <i>Assistance, all</i> | <i>Assistance, developing</i> | <i>Dispute settlement</i> |
|-----------------------------|--------------------------------|--------------------|-------------------|--------------------|------------------------|-------------------------------|---------------------------|
| Number of ratifications | 1.00 | | | | | | |
| Obligations | -0.18 | 1.00 | | | | | |
| Monitoring | 0.01 | 0.35 | 1.00 | | | | |
| Enforcement | 0.03 | 0.30 | 0.35 | 1.00 | | | |
| Assistance, all | 0.12 | -0.12 | 0.10 | -0.00 | 1.00 | | |
| Assistance, developing | 0.30 | 0.07 | 0.21 | 0.17 | -0.13 | 1.00 | |
| Dispute settlement | 0.08 | 0.09 | 0.15 | 0.10 | 0.03 | 0.32 | 1.00 |
| Own secretariat | -0.07 | 0.01 | 0.08 | 0.01 | 0.00 | 0.08 | 0.03 |
| Existing secretariat | -0.07 | 0.22 | 0.28 | 0.21 | 0.11 | 0.09 | 0.03 |
| Global public good | -0.08 | -0.13 | -0.05 | -0.19 | 0.03 | 0.08 | 0.05 |
| Global/domestic public good | -0.08 | 0.09 | -0.02 | 0.09 | -0.11 | -0.01 | 0.09 |
| Pollution | -0.06 | 0.07 | 0.14 | 0.14 | 0.11 | 0.11 | 0.06 |
| Species | -0.16 | -0.05 | 0.01 | -0.10 | -0.16 | 0.07 | -0.02 |
| Nuclear | 0.08 | -0.02 | -0.12 | 0.02 | -0.10 | -0.07 | 0.05 |
| Habitat | -0.12 | 0.03 | 0.16 | 0.13 | -0.09 | 0.14 | -0.00 |

| | <i>Own secretariat</i> | <i>Existing secretariat</i> | <i>Global public good</i> | <i>Global/domestic public good</i> | <i>Pollution</i> | <i>Species</i> | <i>Nuclear</i> | <i>Habitat</i> |
|-----------------------------|----------------------------|---------------------------------|-----------------------------------|--|------------------|----------------|----------------|----------------|
| Number of ratifications | | | | | | | | |
| Obligations | | | | | | | | |
| Monitoring | | | | | | | | |
| Enforcement | | | | | | | | |
| Assistance, all | | | | | | | | |
| Assistance, developing | | | | | | | | |
| Dispute settlement | | | | | | | | |
| Own secretariat | 1.00 | | | | | | | |
| Existing secretariat | -0.59 | 1.00 | | | | | | |
| Global public good | 0.14 | -0.13 | 1.00 | | | | | |
| Global/domestic public good | -0.13 | 0.07 | -0.46 | 1.00 | | | | |
| Pollution | -0.29 | 0.34 | 0.22 | -0.14 | 1.00 | | | |
| Species | 0.23 | -0.20 | 0.05 | 0.06 | -0.39 | 1.00 | | |
| Nuclear | -0.18 | -0.09 | -0.17 | 0.07 | -0.07 | -0.27 | 1.00 | |
| Habitat | 0.04 | -0.01 | -0.16 | 0.07 | 0.05 | 0.14 | -0.07 | 1.00 |