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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 conjecture 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. In

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contrast, we 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.

Keywords Treaty design characteristics · International environmental agreements

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1 Introduction

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 such agreements dealing with the "easy cases" (Oye 1986; Stein 1990; Downs et al. 1996; Sandler 2008).

One category of factors that, arguably, plays an important role in international cooperation has received increasing attention in recent years, namely institutional design features (Koremenos et al. 2001; Mitchell 1994). Indeed, policymakers invest enormous amounts of time and effort in developing ever more complex international agreements in an attempt to solve the problem of concern.

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 et al. 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). Only a few studies, however, 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 (Mitchell 1994; von Stein 2008).

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 allows us to re-assess the conventional, one-dimensional view of international cooperation in terms of a depth versus

participation dilemma and to argue in favor of an approach that uses a multidimensional concept of "depth."[1]

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: 396) 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 km, 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 flexibility mechanisms and withdrawal clauses, in an attempt to solve 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, i.e., the final design features of a treaty.[2]

In this paper we argue 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.

In contrast to much of the existing literature, which focuses primarily on country characteristics to explain participation in international treaties, our research focuses purely on treaty characteristics as explanatory factors. Although we consent to the view that several country characteristics such as power or the political system also matter for participation, we concentrate our analysis on the interplay of various treaty design characteristics and their influence on participation. Our empirical analysis, however, shows that the results are not sensitive to excluding these country characteristics.

We test our theoretical argument on a new dataset that covers more than 200 global environmental treaties. With this empirical focus we hold the pool of potential

[1] Note that we are not the first ones to question the 'depth versus participation' perspective. Gilligan (2004) develops a formal model that shows that this alleged 'broader-deeper' trade-off occurs only when all members of an international agreement set their policy at the same level. If states are allowed to set their policies at different levels, however, this 'broader-deeper' trade-off disappears.

[2] 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.

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 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.

2 Theoretical argument

Political science and international law scholars agree that states enter into legally binding agreements (treaties) in order to solve collective action problems and advance mutual interests (Keohane 1984; Lipson 1991; Martin 1993; Abbott and Snidal 1998, 2000). These scholars also 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 (Guzman 2005; Raustiala 2005; Abbott and Snidal 2000; Chinkin 1989). 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 (UNFCCC) 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 "shallower" commitments are likely to attract more states but result in less problem solving, "deeper" commitments are likely to limit or reduce participation, particularly by those countries whose behavior is least consistent with treaty objectives (Barrett 2003; Downs et al. 2000; Downs et al. 1996).

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.

2.1 Participation reducing institutional design characteristics

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, international agreements with more specific obligations[3] are likely to involve higher implementation costs as well as costs related to a loss of flexibility and thus also sovereignty. Implementation costs refer to whether and how far 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 to 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.[5] For these reasons we expect that, ceteris paribus, international agreements creating specific obligations are likely to attract fewer countries.

[3] 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.

[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.

[5] Several studies find empirical evidence that countries are less likely to ratify treaties in issue-areas such as economic, human rights, environmental, and security policy if they have to change their behavior as a consequence (Hathaway 2007; Goodliffe and Hawking 2006; Downs et al. 2000). In addition, several authors show that treaties that include flexibility provisions and "escape clauses" are ratified by more countries (von Stein 2008; Koremenos 2001, 2005; and Rosendorff and Milner 2001).

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. Monitoring and enforcement mechanisms can help prevent opportunistic behavior by increasing the credibility of commitments and reputation costs associated with reneging on commitments. However, these same mechanisms are often perceived by states as a threat to their autonomy and sovereignty. 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. Similarly, Goldstein and Martin (2000) posit 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 altogether.[6]

In view of these arguments, we claim 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.

2.2 Participation increasing institutional design characteristics

Whereas the specificity of obligations, monitoring and enforcement are likely to have a limiting effect on participation, states often equip international institutions with additional incentives. Three of these, 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 treaties that incorporate dispute settlement procedures because such mechanisms allow parties to resolve conflicts in accordance with stipulated rules and procedures.

Dispute settlement procedures 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).[7] 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).[8] Moreover, since governments cannot foresee all possible contingencies and are thus unable to define *ex ante*

[6] Downs et al. (1996), Hathaway (2005), and Cole (2005, 2009) also argue that states avoid agreements that have strong enforcement mechanisms.

[7] See Finlayson and Zacher (1981), Kovenock and Thursby (1992), 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.

[8] Loss of reputation can also 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).

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.

Although we argue that states are less willing to participate in international agreements they find costly to implement, 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. We posit that granting financial, technical or other types of assistance is likely to help countries and in particular less developed ones to acquire capacities that are deemed essential to comply with obligations contracted through the respective agreement. Assistance provisions can thus affect the cost/benefit calculations of states with respect to committing themselves to an international agreement. For instance, the negative effect of specific obligations could be (at least partially) offset if an agreement additionally offered assistance that enhanced compliance by reducing their implementation costs. Barrett (2003:309) emphasizes that excluding non-parties from treaty-based research and development enhances the incentives for states to ratify these treaties in order to acquire such knowledge. Spilker (2012) 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. 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.

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. Secretariats play a central role in coordinating and managing information flows as well as 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. 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.

3 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. 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 at the same time provide for a 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 (treaty design characteristics) 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 the paper's online Appendix on this journal's webpage), 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), do not correspond closely enough to our theoretical arguments and concepts. We therefore manually coded the variables of interest by means of a content analysis of treaty texts. The coding instructions are available in the online Appendix.

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 according

to 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. For example, the Kyoto Protocol is coded as a treaty that contains obligations since it states clear emission reduction targets for those countries listed in its Annex I.

Monitoring measures whether or not the treaty includes monitoring provisions. The variable *enforcement* indicates whether or not the treaty includes enforcement provisions. Again the Kyoto Protocol serves as an example since it specifies an institutional body to monitor and enforce the goals of the treaty with the establishment of the Subsidiary Body for Implementation.

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. For example, the Convention on the Prevention of Marine Pollution from Land-Based Sources elaborates in great detail the establishment of a tribunal to resolve disputes occurring among its member countries and thus provides for an own dispute settlement mechanism. The UNFCCC also contains clear guidance on how to proceed in the event of a dispute between member countries, which is, however, different to the aforementioned mechanism. If the parties fail to solve their dispute through negotiation, they are urged to submit the dispute to the International Court of Justice.

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. The United Nations Convention to Combat Desertification, for example, established its own secretariat when it came into being in 1994. The main task of the secretariat is to serve the Conference of the Parties and its subsidiary bodies while it also oversees and supports national reporting on progress made to achieve the goals set by the convention. In contrast, the UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (the Aarhus Convention), which was adopted in 1998, relies on the secretariat of the United Nations Economic Commission for Europe (UNECE), which is one of the United Nations' regional commissions and aims at promoting pan-European economic integration.

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. As discussed above, a prime example of a treaty that includes assistance is the Montreal Protocol.

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 public goods such as the conservation of domestic wildlife or natural habitats. An additional variable deals with those agreements for which the distinction between international/global and domestic public goods is not sufficiently clear (for example in the case of the European Convention for the Protection of Animals during International Transport). 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.8 of the online 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.[9]

4 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.

4.1 Main results

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

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

[9] Since the results are very similar and inference does not change whether we use robust standard errors or not, we refrain from showing the results with non-robust standard errors. They are available from the authors on request.

Table 1 Main results

	Coefficient β	Exp(β)	%
Obligations	−0.356 (0.160)**	0.70	−30.0
Monitoring	0.056 (0.154)	1.06	5.7
Enforcement	0.058 (0.157)	1.06	6.0
Assistance, all	0.583 (0.199)***	1.80	79.1
Assistance, developing	2.012 (0.246)***	7.48	648.2
Dispute settlement	0.254 (0.125)**	1.29	28.9
Own secretariat	−0.421 (0.200)**	0.66	−34.3
Existing secretariat	−0.172 (0.176)	0.84	−15.8
Global public good	−0.596 (0.159)***	0.55	−44.9
Global/domestic public good	−0.543 (0.324)*	0.58	−41.9
Pollution	−0.293 (0.150)*	0.75	−25.4
Species	−0.563 (0.163)***	0.57	−43.0
Nuclear	−0.059 (0.219)	0.94	−5.7
Habitat	−0.405 (0.151)***	0.67	−33.3
Constant	1.123 (0.245)***		
Alpha	0.79 (.07)***		
Observations	211		
Log likelihood	−890.50		
LR chi2(11)	167.23		
Prob > chi2	0.00		

Robust standard errors in parentheses; * significant at 10 %; ** significant at 5 %; *** significant at 1 %

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 of participating countries. However, the inclusion of monitoring and enforcement mechanisms does not seem to discourage ratification further. 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.

However, an explanation we cannot fully rule out is the possibility that the monitoring and enforcement mechanisms typically found in environmental treaties have too little bite and therefore they do not really deter countries from ratifying a particular treaty. If countries know, a priori, that monitoring and enforcement provisions are merely nominal, these design features should not influence their ratification decisions. However, in view of the fact that we compare a large number of global environmental treaties it is impossible to code monitoring and enforcement provisions in a more fine-grained manner. And even if we could, we would still not know which of these provisions are really biting in practice. Hence we believe that a binary coding is more reliable and meaningful even though it does not allow us to fully rule out that most

monitoring and enforcement provisions in global environmental treaties are probably little more than nominal.

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 supports our theoretical argument that dispute settlement mechanisms can facilitate cooperation by increasing transparency through the provision of information, reducing transaction costs, and allowing participating countries to resolve conflicts in accordance with stipulated rules and procedures.[10]

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 211 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-

[10] Rosendorff (2005:389) also reports results that are similar to the ones presented here. In particular, he finds that preferential trade agreements (PTAs) that include dispute settlement procedures are "more acceptable to a wider range of countries than agreements without DSP."

dispersion. This implies that the negative binomial rather than a simple poisson model is the adequate model specification.

4.2 Additive 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 add up to an even more ratification deterrent effect than each variable considered separately. That is, monitoring and enforcement of obligations, to the extent the latter are specific, are likely to generate higher implementation costs and higher noncompliance 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. We thus do not argue that there should be any

Table 2 Combinations of treaty characteristics

	United Nations Framework Convention on Climate Change	Kyoto Protocol to the United Nations Framework Convention on Climate Change	International Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification	Protocol on Substances that Deplete the Ozone Layer	United Nations Convention on the Law of the Sea
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 treaty characteristics

	Convention on the High Seas	International Convention for the Prevention of Pollution from Ships (MARPOL)	International Convention for the Regulation of Whaling	Convention on the Conservation of Migratory Species of Wild Animals
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

interaction effects in that, for example, the effect of assistance should differ whether obligations are specified or not. In contrast we would like to show, how the different effects of the various treaty design characteristics add up and thus lead to different ratification effects overall.

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 that the effects add up negatively. 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 support to the conjecture that assistance can make attractive even those treaties that require specific 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 (UNFCC), 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 UNFCC 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.[11]

4.3 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 online 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.

[11] 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.

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 online Appendix shows the coefficient on unanimity voting is negative but 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. More importantly, however, the results concerning our main variables of interest do not change, which lends further support to the above made conclusions.

Our main results rely on a 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*),[12] 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 (Table A.4). 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 ex ante what mechanisms

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

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.[13] 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 online Appendix, Tables A1 and A2). In other words, if negotiators were willing and able to design treaties so that 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

[13] See also Fearon (1998) on how the shadow of the future can affect international bargaining and consequently the level of cooperation achieved.

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 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 expectation is also supported by Table A.7 in the online 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. This supports our conclusion that treaty characteristics indeed influence participation in environmental treaties and that these effects are not simply driven by the bargaining phase of treaty establishment.

In addition to showing that our results are robust in different subsamples, Tables A.5 and A.6 report additional insights that merit discussion. For example, the effect of the two variables measuring assistance is more pronounced in the models that consider only ratification by the poorest 10 % (model 1 in Table A.6) or the poorest 25 % (model 4 in Table A.6) of the countries in our sample. Since technical or financial assistance is mainly included in environmental treaties to transfer knowledge, technologies, and resources to low capacity countries, this finding is completely in line what one should observe following our theoretical argument.

Finally, we would like to discuss an additional way in which the negotiation phase could affect the results of our analysis and for which we cannot fully control. Theoretically it is possible that the number of countries at the negotiating table affects which design characteristics are included in the specific treaty. For example, the higher the number of potential member countries the more likely it might be that such characteristics as secretariats are included since more countries means more need for coordination. Furthermore, the more potential member parties the more heterogeneous the interests of these parties and thus the greater the need for dispute settlement procedures. Controlling for this potential endogeneity problem would require finding suitable instruments for all of the different design characteristics included in our analysis. While it would be extremely hard to find one suitable instrument for one design characteristic, finding eight exogenous variables to instrument for the various design characteristics seems impossible. Hence we acknowledge that there exists a potential endogeneity problem, which we, unfortunately, cannot fully control for. The potential biases that might arise by not controlling for this problem could go into the

following directions: we probably underestimate the deterrent effect of specific obligations, and maybe also of monitoring and enforcement, since countries at the negotiating table might agree on lowest common denominator solutions to attract as many member countries as possible. Furthermore, as mentioned already above, those treaties that are attractive to a great number of potential member countries should be treaties that are more in need of design characteristics such as secretariats and dispute settlement mechanisms. Finally, treaties regulating issue areas that require the inclusion of many countries both from the developed and the developing world are probably the treaties with the highest likelihood of including positive incentives such as assistance provisions.

5 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. 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 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, to 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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