

# Regime design and cooperation: Differential treatment of parties in international environmental agreements

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## **Abstract**

Many international environmental agreements (IEAs) have adopted differentiated rules for groups of countries, based on the recognition of the different circumstances of parties, such as special needs of certain parties (especially developing countries), or the different contribution of parties to the environmental problem at hand. The resulting differential treatment usually consists of differences in the stringency of obligations, different timing of their application, and/or international financial, capacity-building or technological assistance. The existence (and design) of preferential treatment for some groups of parties may be a precondition for their entering the agreement in the first place. But in the long term, some types of preferential treatment may lead to new incentives that make broader (and deeper) cooperation more difficult, as observed for the climate change regime by Castro et al. (2014).

In this article, I consider the relationship between the existence of differential treatment of parties to an IEA and the outcomes of the bargaining process that led to the adoption of the IEA as well as its effectiveness in terms of compliance and problem-solving. Following the literature on the rational design of international agreements, I regard country differentiation as akin to other flexibility provisions that are expected to facilitate deeper cooperation among parties. Using data from the International Regimes Database (IRD), I test whether country differentiation facilitates countries' participation in an agreement, improves compliance of parties with the agreement's provisions, and ultimately improves problem solving by the agreement.

**Keywords:** International environmental agreements; regime design; negotiation; cooperation

## Regime design and cooperation: Differential treatment of parties in international environmental agreements

*“All States enjoy sovereign equality. They have equal rights and duties and are equal members of the international community, notwithstanding differences of an economic, social, political or other nature.”*

1970 Declaration of Principles of International Law

*„[...] equity shall be reflected by having a fair sharing and equitable allocation framework wherein developed country Parties take the lead in undertaking deep binding emission reductions in the short-, mid- and long-term that reflect their historical and current responsibility for global emissions and in providing finance, technology and capacity building to developing countries.“*

Submission by China, India, Malaysia, Philippines and Thailand  
to the UNFCCC, 3 October 2011

### 1. Introduction

Differential treatment of parties to an international environmental agreement (IEA) has become a relatively common feature of international law. Several multilateral environmental agreements, including the 1982 United Nations Convention on the Law of the Sea, the 1983 International Undertaking on Plant Genetic Resources, the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, the 1992 Convention on Biological Diversity, the 1992 Framework Convention on Climate Change and the 1994 Convention to Combat Desertification, among others, have incorporated the notion of differentiated responsibility of states with respect to the protection of the environment. The basis of this differentiated responsibility is the recognition, already in Principles 6 and 7 of the Rio Declaration, of countries' different circumstances and levels of contribution to environmental degradation (UN 1992). The resulting differential treatment usually consists of less stringent obligations, different timing of the application of provisions (i.e. grace periods or delayed implementation of obligations, or priority implementation in specially affected countries), and international assistance in terms of financing, capacity building and/or technology transfer (Matsui 2002; Hepburn and Ahmad 2005). Beyond the environmental domain, also the World Trade Organization includes “Special and Differential Treatment” provisions for developing countries and Least Developed Countries, based on the notion that countries at different levels of development have different trade policy needs. Both in the context of the climate change convention and of the WTO it has already been noted that the created country categories have become rigid and are being considered as negotiation goals themselves: an academic discussion about how to make this differential treatment more flexible and dynamic has emerged (Berk and den Elzen 2001; Hoekman et al. 2004; Kasteng et al. 2004; Page and Kleen 2005; Winkler and Rajamani 2013; Castro et al. 2014).

Legal scholars have examined such country differentiation in international agreements from a normative perspective (Cullet 1999; Halvorssen 1999; Rajamani 2000; Cullet 2003; Hoekman et al. 2004; Hepburn and Ahmad 2005; Page and Kleen 2005; Rajamani 2006; Honkonen 2009). They have detailed the

philosophical basis for the departure from the notion of equality to a notion of equity in international environmental law, discussed the arguments supporting and opposing the introduction of differential treatment and categorized the differential treatment provisions existing in several IEAs. Rajamani (2006), for example, classifies differential treatment provisions into those that differentiate with respect to the central obligations contained in the treaty (e.g. targets for only one group of countries), those that differentiate with respect to the implementation of obligations (e.g. delayed compliance schedules, different base years, softer non-compliance rules), and those that provide assistance to comply with obligations (capacity building, technology transfer, finance). Magraw (1990) has recognized that while some differential treatment provisions are explicit in the treaty texts, some are implicit, in the sense that the provision establishes identical treatment to all parties, but its application allows considering characteristics that vary from country to country (e.g. refer to a state's technical and regulatory ability or its resource availability).

So far, however, there is no study that looks at the effect of differential treatment on the effectiveness of international agreements in a comparative manner. This is a relevant question, as differential treatment of parties to an international agreement can be conceived as akin to other 'flexibility provisions' as defined by Rosendorff and Milner (2001, p. 829): escape clauses that allow "countries to escape the obligations agreed to in the negotiations". The academic debate around such flexibility provisions deals with whether they encourage countries to engage in deeper cooperation, or whether they rather make cooperation meaningless (Kucik and Reinhardt 2008). One of the key challenges of the academic discussion is that the existence of such flexibility provisions is endogenous to the decision of countries to enter the agreement and to their level of commitment within the agreement. Fearon (1998) argues that there is a trade-off between efficient bargaining and effective agreements. In this article's case, the existence (and specific design) of preferential treatment for some groups of parties may be a precondition for their entering the agreement in the first place. But in the long term, some types of preferential treatment may lead to new incentives that make broader (and deeper) cooperation more difficult, as observed for the climate change regime by Castro et al. (2014).

In this article, I consider the effect of the existence of differential treatment of parties to an IEA on three types of outcomes of the bargaining process that led to the adoption of the IEA: (i) country participation in the agreement, (ii) compliance of parties with the agreement's provisions, and (iii) solving the problem that the agreement was supposed to address. I do so by drawing on data from the International Regimes Database (IRD) on the formation, attributes and outcomes of 172 regime elements within 23 international environmental regimes. The article aims to contribute to the academic discussion on the trade-off between flexibility in regime design and efficient negotiations (Downs et al. 1996; Fearon 1998; Kucik and Reinhardt 2008).

The next section outlines the theory behind the hypotheses regarding the effects of differential treatment on IEA outcomes. Section 3 describes the operationalization, data and methods. The results are presented in section 4. Section 5 provides first conclusions and outlines areas for future research.

## **2. Differential treatment, cooperation and effectiveness of IEAs**

Institutionalist IR theory has recently devoted some attention to the study of the relationship between bargaining and depth of cooperation. As observed by Downs et al. (1996), the fact that many existing international regimes achieve good levels of compliance without much attention to enforcement may be

due to the fact that most of these agreements require member states to make only small adjustments in policy, thus giving them little incentive to defect. Fearon (1998) responds by arguing that there is a trade-off between the bargaining phase and the implementation and enforcement phase of international cooperation problems: the greater the expected gains from cooperation, the harder will governments bargain, and the more difficult it will be to reach a cooperative outcome. There is thus a trade-off between efficient bargaining and effective agreements. In line with this argument, the work on flexibility in international agreements looks at the circumstances under which flexibility provisions are included in the design of international agreements (Koremenos et al. 2001; Rosendorff and Milner 2001; Thompson 2010), and at whether including flexibility provisions in such agreements can facilitate cooperation in the first place (Rosendorff 2005; Kucik and Reinhardt 2008).

This article follows this existing literature to investigate the effect of differential treatment on three different measures of cooperation and regime effectiveness: (i) country participation in the agreement, (ii) compliance of parties with the agreement's provisions, and (iii) solving the problem that the agreement was supposed to address.

Differential treatment aims to satisfy the interests of particular parties that, while willing to cooperate (or at least have a say) in the solution of an international problem, are in a disadvantaged situation to do so: either because their specific circumstances make cooperation more costly for them (e.g. developing countries usually argue that they first need to achieve development and reduce poverty before tackling environmental problems), or because they are not important contributors to the problem. Differential treatment may provide these countries with additional time to achieve specific commitments, may grant them technological or financial assistance to do so, or may exempt them altogether of commitments (see Appendix 1 for an overview of differential treatment provisions in some IEAs). Particularly if substantial heterogeneity exists across parties (or potential parties) to an agreement, differential treatment may make them easier to be ratified (Swanson 2001; Rosendorff 2005). At the same time, being party to the agreement allows these countries to have a voice (and, under the frequently used unanimity or consensus voting rules, even a veto) in future decision-making within the regime. Being a party may also be tied to receiving certain benefits (in addition to the improvement of the environment, which is often a public good and hence non-excludable). It is to be expected, thus, that differential treatment will make it more attractive to states to become parties to the agreement. This is what I expect under hypothesis 1:

*H1: Differential treatment increases the likelihood that states will become parties to the agreement.*

Rosendorff (2005), as well as Kucik and Reinhardt (2008) have analysed the effect of certain flexibility provisions, namely dispute settlement mechanisms and domestic antidumping mechanisms, on cooperation under the WTO, and found that flexibility not only encourages more states to become party to the agreement, but also encourages them to agree to and implement tighter commitments under the agreement. Differential treatment not only provides flexibility for some parties to comply with the agreement, in the form of delayed compliance schedules, simplified commitments or exemptions. It may also provide material support for achieving compliance through financial and/or technical assistance. It is therefore expected that the existence of differential treatment will improve parties' compliance with the agreement:

*H2: Differential treatment increases the likelihood that states will comply with the provisions of the agreement.*

Differential treatment grants specific privileges (financial and technical support, delayed compliance schedules, simplified commitments, etc.) to certain groups of countries. To the extent that some of these

privileges water down the level of stringency of commitments to address the environmental problem at hand, differential treatment will reduce the overall effectiveness of the IEA in solving the problem. In addition, countries subject to these privileges – e.g. countries initially granted exemptions from economic or environmental obligations – have an incentive to lobby for the continuation or expansion of this preferential treatment in subsequent negotiation rounds. In the long term, this may prevent the evolution of the regime into a more inclusive one in which more countries take up commitments and actively contribute to the solution of the problem – differential treatment becomes path-dependent (Castro et al. 2014).

*H3: Differential treatment reduces the likelihood that an agreement will be effective in solving the environmental problem being addressed.*

### **3. Operationalization, data and methods**

The hypotheses described above are tested in a multivariate regression framework using data from the International Regimes Database (IRD) (Breitmeier et al. 1996; Breitmeier et al. 2006) and the International Environmental Agreements Database Project (Mitchell 2013). The IRD is a very comprehensive dataset describing, with over 200 variables, the formation, attributes and outcomes of 23 international environmental regimes, which were coded by international experts on the basis of their own expert knowledge of the regimes and using a common data protocol. Its unit of analysis is the “regime element”: a period of time within an environmental regime, in which the operation of the regime is continuous, and its principles, key norms, leading actors and functional scope remain broadly the same (Breitmeier et al. 1996). For example, the regime for Long-Range Transboundary Air Pollution (LRTAP) is subdivided into the following six regime elements:

- LRTAP Convention 1979-1982
- LRTAP Convention 1982 -1998
- First Sulphur Protocol 1985-1998
- NO<sub>x</sub> Protocol 1988-1998
- VOCs Protocol 1991-1998
- Second Sulphur Protocol 1994-1998.

Each of these elements constitutes a separate observation in the dataset, because a significant change in the characteristics of the regime happened between them. Most regimes (and their regime elements) have been coded independently by two different experts. All in all, the dataset hence comprises 172 observations (coded regime elements) within 23 regimes or issue areas.

The IEA Database Project includes historical and up to date information on over 1190 multilateral environmental agreements’ membership, as well as full text versions of the agreements, and links to their secretariats and relevant external statistical information.

#### Dependent variables

For the operationalization of two of the dependent variables, as well as for the selection of appropriate controls that are also expected to affect compliance and IEA effectiveness, this paper builds upon the regression models used in Breitmeier et al. (2011). To test the first hypothesis on becoming party to the

agreement I use the variables *ratio\_parties* and *years\_to\_ratify*. *Ratio\_parties* measures the ratio of states that became party to the agreement (either by ratifying or accessing it, or through automatic entry into force after signature) to the states that are potentially relevant as parties to the agreement. The data on actual membership is obtained from the IEA Dataset Project, while the number of potentially relevant parties was obtained by taking the maximum out of three variables: the count of states listed as signatories and/or parties to an IEA in the IEA Dataset Project; the sum of states involved in the negotiations, states being observers in the negotiations, important states not participating in the negotiations and important states not signing the agreement, all from the IRD dataset; and the count of causers of and sufferers from the problem listed in the IRD dataset. *Years\_to\_ratify* is based on data from the IEA Dataset Project and measures, for each agreement, the average time (in years) that took its parties to ratify it, starting from the date it was opened for signature. Both variables are expected to capture different aspects of the willingness of states to become parties to the agreement. No comparable dependent variable was tested in Breitmeier et al. (2011), who only focused on the following two measures of effectiveness. According to hypothesis 1, I expect that differential treatment will have a positive effect on *ratio\_parties* and a negative effect on *years\_to\_ratify*.

The second hypothesis, on the likelihood that states will comply with the provisions of the agreement, is operationalized in the same way as in Breitmeier et al. (2011): the variables CONFORMITY\_ALL\_MEMBERS (Did all members generally conform with the provisions of the regime rules?) and CONFORMITY\_CAUSAL (Did the regime have a causal influence on the degree of conformance of its members?) (both under variable 303A in the IRD) are first dichotomized and then multiplied with each other to generate the variable *effect\_compliance*. *Effect\_compliance* hence takes the value of 1 if the regime had a causal positive influence on compliance, and zero in all other cases. It has a missing value whenever any of the two constituent variables also has a missing value. Following hypothesis 2, I expect that differential treatment will have a positive effect on *effect\_compliance*.

The third hypothesis on the effectiveness in terms of problem-solving, is again operationalized as in Breitmeier et al. (2011): the variables PROBLEM\_CHANGE (How did the state of the world change during this period with respect to the problems addressed by the regime?) and PROBLEM\_CHANGE\_CAUSAL (Did the regime exert a causal influence on these developments?) (both under variable 304A in the IRD) are dichotomized and multiplied with each other to generate the variable *effect\_problemchange*, which indicates whether the regime has had a positive causal effect on the improvement of the problem being addressed. In the IRD, PROBLEM\_CHANGE and PROBLEM\_CHANGE\_CAUSAL are both coded at the problem level: for each regime element, one or several problems being addressed were identified, and these two variables were coded for each of these problems. To generate the variable at the regime element level, I take the mode of the values that the variables take at the problem level before dichotomizing them. Following H3, I expect that differential treatment will have a negative effect on *effect\_problemchange*.

### Main explanatory variables

The IRD dataset includes several variables that in some way or another depict differential treatment of states within a regime. The variable MEMBER\_CATEGORY (208D in the IRD) asks whether there is a single category of membership or whether there are provisions establishing more than one category of membership. MEMBER\_ROLE\_DIFFERENTIATE (208E) asks whether the regime's provisions allow for role differentiation among the members. Both variables are dichotomous and at the regime element level. In addition, the variable RULE\_DIFFERENTIATE (205E) asks, for each substantive rule coded within each regime element, whether it differentiates among its members in terms of requirements,

prohibitions, or permissions. Due to the slight nuances between these variables, it is likely that in some cases they are describing the same differentiation, but in others they are not.

I therefore first create the variable *different\_categories*, which is based on the IRD variables MEMBER\_CATEGORY and MEMBER\_ROLE\_DIFFERENTIATE: If these two variables are coded in the same way in the IRD dataset (which is by far the most frequent case), and also in the same way by the two experts coding the same regime element, then I take the original IRD coding. If there are any differences, either across the two IRD variables or across the two experts, I go to the agreements' texts and decide myself whether there is a differentiation of parties' categories. The most important source of disagreement in the existing coding is when parties to an agreement can assume different roles (importers vs exporters, country in which a vessel is registered vs country to which it arrives, etc.), even though all parties are actually treated equally as all of them can assume any of these roles at any given point in time. In this case I consider that there is no differentiation. *Different\_categories* takes the value of 1 if the agreement recognizes different categories of parties, and of 0 otherwise.

In addition, I use the IRD variable RULE\_DIFFERENTIATE (205E) to create two new variables that represent two of the categories of differential treatment introduced by Rajamani (2006, p. 93ff): *diff\_implementation* and *diff\_obligations*. For each substantive rule coded within each regime element, RULE\_DIFFERENTIATE asks whether the regime differentiates among its members in terms of the application of the rule. Whenever this variable is coded as “no differentiation” by both coders of the same regime element, I adopt this coding for *diff\_implementation* and *diff\_obligations*. Whenever at least one of the coders identifies that there is differentiation, I carefully read the rule and if necessary the agreement text to decide what type of differentiation is being made. If there is differentiation in terms of the way the agreement's obligations are implemented (delayed compliance schedules, delayed reporting schedules, flexibility in terms of base years for reporting, or softer approaches to non-compliance), the variable *diff\_implementation* takes the value of 1; if there is differentiation in terms of the level or type of the central obligations contained in the agreement (emission or pollution reduction targets, financial contributions, specific bans, etc.) then the variable *diff\_obligations* takes the value of 1. Once they are so coded at the rule level, these two variables are aggregated at the regime element level by taking the value of 1 (differentiation) whenever there is at least one rule within the regime element that applies the corresponding type of differentiation, and 0 (no differentiation) otherwise. Clearly, as each regime element includes several rules, *diff\_implementation* and *diff\_obligations* can take any value independently of each other.

The identification of differential treatment in the variable *different\_categories* may not be consistent with the one in *diff\_implementation* and *diff\_obligations*. This is due to the fact that not all aspects of the treaties are coded as rules, or not rules implying differentiation specifically define “categories” of parties. For example, there are several agreements that differentiate categories of countries with or without decision-making power within the agreements' bodies. However, this decision-making power does not necessarily translate into different obligations under the treaty. As another example, certain agreements incorporate the possibility for parties to make reservations, or incorporate more flexible provisions for a particular party that is subject to special circumstances. While there is clearly a differential treatment in the implementation of a rule here, it is not based on a pre-defined categorization of parties.

Finally, differential treatment of members to IEAs frequently appears also in form of financial or technical support (which is the third category of differential treatment introduced by Rajamani (2006)). The IRD includes the variable FINANCIAL\_MECHANISMS (211C) that describes each regime's financial mechanism, including, inter alia, following categories: 3 = Trust fund or similar mechanism to support the regime's administration and national participation of developing countries; 4 = Trust fund or similar

financial mechanism to compensate states for certain activities in the international/global interest; 5 = Trust fund or similar financial mechanism to subsidize national compliance; 6 = Trust fund or similar mechanism to protect resources that remain under national sovereignty. I create a dummy variable, *finance\_devctys*, that takes the value of 1 for all regimes in which FINANCIAL\_MECHANISMS includes category 3, and a dummy variable *finance\_compensate*, that takes the value of 1 for all regimes in which FINANCIAL\_MECHANISMS includes 4, 5, or 6. *Finance\_devctys* hence indicates whether the regime provides funding for developing countries' participation in negotiations and meetings. *Finance\_compensate* indicates whether the regime provides compensation or a subsidy for activities linked to compliance with its aims. While the IRD coding does not take into account that such compensation or subsidy payments may be themselves differentiated across member groups, it is possible that such financial support appears together with differentiation. *Finance\_devctys* and *finance\_compensate* will hence be tested as potential complements to *different\_categories*.

### Controls

Of course, participation in a regime, compliance and effectiveness do not depend solely on differential treatment of member parties. The literature on regime effectiveness supports the idea that the characteristics of the problem at hand are an important predictor of effectiveness, as well as the level of uncertainty with respect to the potential solutions to it, the distribution of power among the parties and the institutional characteristics of the regime (Mitchell 1994; Miles et al. 2002; Breitmeier et al. 2006). I follow Breitmeier et al.'s (2011) choice of explanatory variables to establish a baseline model of compliance and effectiveness.

*Problem\_understood* is a categorical variable describing how well the nature of the problem was understood (the higher its value, the better the understanding of the problem). It is based on variable 104A of IRD, which is coded at the problem level. Hence, *problem\_understood* is summarized at the regime element level by taking the mode for each regime element. It is used as a proxy for the notion of level of uncertainty about solving the environmental problem being addressed: the higher the understanding, the lower the uncertainty, and hence the higher I expect the compliance with and the effectiveness of the regime to be.

Problem *malignancy* is used in Breitmeier et al. (2011) to depict the level of complexity of the problem in terms of how incompatible the interests of the parties were and whether there was an incentive to disobey the rules of the regime. Accordingly, it is generated as the sum of the IRD variables INTEREST\_DISOBEY (101G) and INTEREST\_COMPATIB (101I). The higher the malignancy, the lower the expected compliance and the effectiveness.

*Powersetting\_asymmetry*, based on variable 102C of the IRD dataset, is included to control for the level of asymmetry between the nations involved in negotiating the agreement in terms of issue-specific power resources.

In terms of institutional variables, *ruleused\_mode* (based on variable 210B of IRD) describes the most frequent type of rule used in the regime's decision-making processes (in increasing order, qualified majority, consensus, unanimity); *deep\_rules* (205G) indicates whether the regime is deep with respect to the density and specificity of its rules; *rulebinding* (205C) indicates how strongly legally binding the regime's rules are; and *compliance\_managerial* (212E) indicates whether the regime uses a managerial approach to compliance (rather than an enforcement one).



Appendix 2 describes all variables in more detail, including their summary statistics. Appendix 3 presents a correlation table.

## Methods

The three hypotheses are tested using multivariate regressions, with the errors clustered at the regime level to account for the non-independence between observations (regime elements) describing several stages of the same regime. For the first hypothesis I use linear regressions as the dependent variables (*ratio\_parties* and *years\_to\_ratify*) are continuous. For *ratio\_parties*, in addition, tobit models were also tested to account for the fact that the variable is censored at 0 and at 1. As the results did not vary significantly, only the results for the OLS regressions are reported. For hypotheses 2 and 3, logistic regression is used as the dependent variables are binary. Due to the low number of observations (several values are missing for some variables), not all control variables are included at the same time in the regressions.

## 3. Results

Baseline models replicating Breitmeier et al.'s (2011) regressions (without the country differentiation variables) are included in Appendixes 4 and 5 for comparison. Tables 1 to 3 present the results of the effect of differential treatment on agreement membership and time to ratification (H1), compliance (H2) and problem solving effectiveness (H3), respectively.

The results in Table 1a show a consistently positive, but not significant, effect of country differentiation on the ratio of relevant states that have become parties to the agreement. Due to the low statistical significance of the effects, this result fails to provide support for Hypothesis 1. A potential explanation for this weak result is that identifying the amount of relevant countries for a particular agreement is a difficult task, and the IRD dataset only allows to approximate it. Another possible explanation is that countries that do not benefit from the differential treatment may be less likely to enter an agreement in which such provisions are in place. The Kyoto Protocol, which was never ratified by the US, is an example of such a case. Already during the democratic Clinton government, the US Senate failed to ratify the treaty because it did not meet the minimum requirements it had set for such ratification (Mathews 2000). Among these unmet requirements was the one of “meaningful participation of developing countries in binding commitments limiting greenhouse gases”, which is one of the critical differential treatment provisions in the Kyoto Protocol. Once Bush took seat as US president, opposition to the treaty only increased.

Interestingly, however, the variable indicating provision of finance for participation of developing countries in the negotiations, *finance\_devctys*, shows a significant positive effect on the ratio of parties to relevant countries, which is robust to different combinations of the control variables (not shown here but available on request). The effect is substantial: the provision of finance for participation of developing countries in negotiations leads on average to 17.5% more countries being party to the agreement. The variable *finance\_compensate* is, in contrast, never really close to significance. This effect would mean that one particular form of differential treatment, providing support for developing countries to participate in negotiations, increases the likelihood that relevant states become parties to the agreement, which is in line with Hypothesis 1.

Table 1b displays the effect of differential treatment on the average time taken by parties to the agreement to ratify it. While the effect of differential treatment is statistically significant in only some of the

regressions, it is consistently negative and substantial: all else equal, regressions RATIF1 – RATIF5 show that allowing for different categories of parties to the agreement reduces the average time to ratify it by, on average, 2.4 to 4.4 years. Regression RATIF6 shows that providing finance to compensate for the costs of complying with the agreement reduces the time to ratify it by, on average, 4.7 years. According to regression RATIF7, finally, introducing differentiation with respect to the central obligations within the agreement reduces the time to ratify it by, on average, 6.6 years. The results on Table 1b are thus quite supportive of Hypothesis 1: providing differential treatment does indeed increase the likelihood that (and speed at which) states become party to the agreement.

**Table 1a: Effect of differential treatment on ratio of states becoming party to the agreement**

	(PARTY1)	(PARTY2)	(PARTY3)	(PARTY4)	(PARTY5)	(PARTY6)	(PARTY7)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors
different_categories	0.0795 (0.0814)	0.0879 (0.0832)	0.0850 (0.0837)	0.134 (0.0872)	0.0708 (0.0914)	0.0896 (0.0826)	
finance_devctys					0.175 ** (0.0770)		
finance_compensate						0.0766 (0.0885)	
diff_obligations							0.145 (0.104)
diff_implementation							0.0729 (0.0593)
problem_understood	0.0201 (0.0343)	0.0208 (0.0357)	0.0164 (0.0370)	-0.0105 (0.0353)	0.0299 (0.0361)	0.0166 (0.0377)	0.0325 (0.0273)
malignancy	-0.000405 (0.0137)	0.00209 (0.0132)	0.000775 (0.0132)	0.0128 (0.0115)	-0.0157 (0.0192)	-0.0136 (0.0195)	-0.00510 (0.0127)
powersetting_asymmetry	0.0646 ** (0.0289)	0.0603 ** (0.0288)	0.0402 (0.0335)	0.0345 (0.0336)	0.0708 ** (0.0263)	0.0810 *** (0.0253)	0.0766 *** (0.0204)
ruleused_mode	-0.108 * (0.0550)	-0.108 * (0.0540)	-0.119 ** (0.0523)		-0.183 ** (0.0781)	-0.125 * (0.0629)	-0.0944 * (0.0548)
deep_rules		-0.00684 (0.0283)	-0.00984 (0.0279)	0.0154 (0.0324)			
rulebinding			0.0763 (0.0564)				
compliance_managerial				0.0302 (0.102)			
Constant	0.686 *** (0.210)	0.691 *** (0.204)	0.586 ** (0.219)	0.431 ** (0.203)	0.875 *** (0.261)	0.786 *** (0.220)	0.610 *** (0.161)
Observations	104	102	101	108	88	88	104
Number of clusters	35	35	35	34	30	30	35
R2	0.142	0.148	0.174	0.136	0.285	0.218	0.169
Log likelihood	-2.486	-2.067	-0.447	1.865	11.09	7.134	-0.783

Note: Standard errors in parentheses. Significance levels are \*\*\* 0.01; \*\* 0.05; \* 0.10.

**Table 1b: Effect of differential treatment on average time to ratification of the agreement**

	(RATIF1)	(RATIF2)	(RATIF3)	(RATIF4)	(RATIF5)	(RATIF6)	(RATIF7)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors
different_categories	-3.643 *	-3.668 *	-3.939	-2.391	-4.411 *	-3.074	
	(2.034)	(2.159)	(2.342)	(3.060)	(2.523)	(2.501)	
finance_devctys					-0.833		
					(1.738)		
finance_compensate						-4.716 ***	
						(1.478)	
diff_obligations							-6.556 ***
							(1.503)
diff_implementation							-1.068
							(2.334)
problem_understood	2.800 **	3.001 **	2.825 **	2.290 **	3.214 **	2.809 *	2.258 **
	(1.146)	(1.274)	(1.239)	(1.035)	(1.389)	(1.451)	(1.017)
malignancy	0.874 **	0.819 **	0.778 **	0.776	0.910	0.875	0.894 ***
	(0.375)	(0.367)	(0.372)	(0.492)	(0.626)	(0.585)	(0.316)
powersetting_asymmetry	1.906 **	1.906 *	1.318	3.035 **	1.235	1.079	1.462 *
	(0.903)	(0.957)	(1.020)	(1.204)	(1.014)	(0.830)	(0.756)
ruleused_mode	-3.263	-3.653	-4.053		-5.243	-5.299	-3.675
	(2.896)	(2.907)	(3.058)		(3.570)	(3.240)	(3.085)
deep_rules		-0.681	-0.954	-0.647			
		(0.902)	(0.981)	(0.786)			
rulebinding			2.295 *				
			(1.203)				
compliance_managerial				2.788			
				(4.622)			
Constant	-1.996	0.731	-1.419	-11.24	2.671	4.670	1.308
	(8.083)	(7.553)	(7.481)	(8.860)	(10.35)	(10.29)	(8.647)
Observations	104	102	101	108	88	88	104
Number of clusters	35	35	35	34	30	30	35
R2	0.202	0.210	0.229	0.143	0.273	0.303	0.233
Log likelihood	-360.1	-353.7	-349.5	-381.2	-303.0	-301.1	-358.1

Note: Standard errors in parentheses. Significance levels are \*\*\* 0.01; \*\* 0.05; \* 0.10.

Table 2 presents the results for hypothesis 2: the effect of differential treatment on the likelihood that parties comply with the agreement, and shows that differential treatment tends to increase this likelihood, which provides support to the hypothesis. While the results are not completely robust to the inclusion of all control variables, in several of the regressions they are clearly statistically significant. One important limitation of these regressions is the relatively low number of observations (between 66 and 88), which of course impacts on the statistical significance of the results and may also bias the estimation, as the maximum likelihood estimation required for the logit model is consistent and unbiased under asymptotic conditions. Nonetheless, the effect of differential treatment on compliance seems to be quite substantial. Using regression COMPL2, for example, for an average type of agreement, having different categories of parties to the agreement increases the likelihood of parties being in compliance by 15%. The average

marginal effect – across all agreements in the sample – of having different categories of parties to the agreement is even stronger, as it increases the likelihood of parties being in compliance by 24%.

The regressions on Table 2 also show that the effect varies with the different specifications of differential treatment. While having different categories of parties (regressions COMPL1-COMPL6) clearly has the positive effect on compliance mentioned above, the differentiation of obligations or of conditions for implementing obligations (regression COMPL7) does not seem to be relevant, which is unexpected. The provision of finance for developing country participation in negotiations (regression COMPL5) does not have an effect on compliance either, which is however not so surprising as participating in negotiation meetings does not necessarily improve the domestic processes required to implement a treaty and be in compliance with it. What is very striking, however, is that the provision of finance to compensate parties for the costs of implementing the agreement or complying with it (regression COMPL6) has a negative effect on compliance. Finance should facilitate compliance, not hinder it. It should be noted that this negative effect is only there if we control for the existence of different categories of countries – once *different\_categories* is excluded from the regression, *finance\_compensate* does not have any significant effect on compliance at all.

Graphs 1-9 in Appendix 6 provide an idea of how the effect of differential treatment on compliance varies when the other variables in the regression adopt different values. Graphs 1-5 are based on regression COMPL2, and graphs 6-9 on regression COMPL6. The graphs show that differential treatment interacts in interesting ways with other attributes of multilateral environmental agreements. The more malignant the problem, the larger (and more significant) the effect of *different\_categories* on compliance. This finding complements the argument by Koremenos et al (2001) that states adopt more flexible agreement structures to lessen the negative effects of high distributional costs of addressing the problem. Here we indeed see that there is an interaction between the malignancy of the problem (i.e. its level of complexity and of incompatibility of interests across parties) and the introduction of different categories of parties to the agreement (a flexibility provision), and that this interaction affects compliance with the agreement. In a similar vein, Graph 2 shows that the better understood the problem is, the smaller (and less significant) the effect of *different\_categories* on compliance. This result is also interesting in the context of Rosendorff and Milner's (2001) finding that the more uncertainty about the state of the world, the more likely it is that parties in a negotiation create flexibility provisions in institutional design. Here we see that this is effective: the more uncertainty there is (hence, the worse the understanding of the problem), the stronger the effect of differential treatment (a flexibility provision) on compliance. Graph 3 shows that the effect of *different\_categories* on compliance is significant at middle levels of power asymmetry between the parties negotiating an agreement, but not significant at very high or very low levels of power asymmetry. It is however substantially stronger the higher the power asymmetry is. Graphs 4 and 5 illustrate the variation of the effect of *different\_categories* depending on other design elements of the agreement: the tougher the decision rule in use, the stronger the effect of *different\_categories* on compliance, and the deeper the agreement, the weaker the effect of *different\_categories* on compliance.

Including *finance\_compensate* in the regression (model COMPL6) does not substantially alter the effects of *different\_categories* seen above. However, as noted above, the effect of *finance\_compensate* on compliance with the agreements is dependent on whether different categories of countries have been established: it becomes insignificant and undistinguishable from zero (at 95% level) when different categories of parties exist. So only when parties are not differentiated in various categories, I find that providing finance for compensating the cost of compliance has a detrimental effect on compliance. Graphs 6-9 in Appendix 6 show the marginal effects of the variable *finance\_compensate*, as all the other variables in the regression COMPL6 adopt different values. The negative effect of providing finance for compensation on

compliance with the regime is stronger the more malignant and the less understood the problem is, the more unevenly power is distributed, and the tougher the decision rule in use is.

**Table 2: Effect of differential treatment on regime compliance**

	(COMPL1)	(COMPL2)	(COMPL3)	(COMPL4)	(COMPL5)	(COMPL6)	(COMPL7)
	Logit	Logit	Logit	Logit	Logit	Logit	Logit
	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors
different_categories	2.528 *	3.452 **	3.385 **	1.790	1.999	3.347 **	
	(1.534)	(1.667)	(1.630)	(1.324)	(1.365)	(1.604)	
finance_devctys					0.933		
					(1.489)		
finance_compensate						-1.909 **	
						(0.876)	
diff_obligations							1.594
							(1.772)
diff_implementation							-1.886
							(1.175)
problem_understood	0.765 **	0.850 **	0.878 **	0.482	0.843 **	0.620 *	0.895 *
	(0.376)	(0.396)	(0.426)	(0.555)	(0.347)	(0.369)	(0.494)
malignancy	-0.659 ***	-0.495 *	-0.496 *	-0.243	-0.820 ***	-0.860 ***	-0.461
	(0.251)	(0.268)	(0.273)	(0.321)	(0.301)	(0.295)	(0.332)
powersetting_asymmetry	-0.538	-0.831	-0.749	-1.347 *	-0.521	-0.685	-0.112
	(0.733)	(0.807)	(0.864)	(0.776)	(0.737)	(0.739)	(0.465)
ruleused_mode	-1.553 *	-1.460	-1.429		-1.968 **	-1.946 *	-1.321
	(0.836)	(0.910)	(0.929)		(0.995)	(0.995)	(1.040)
deep_rules		1.033 ***	1.050 ***	1.222 ***			
		(0.319)	(0.326)	(0.431)			
rulebinding			-0.386				
			(0.678)				
compliance_managerial				-1.410			
				(2.343)			
Constant	8.422 **	4.681	5.367	3.871	10.11 **	11.70 **	6.314 **
	(4.010)	(3.683)	(3.426)	(3.924)	(4.476)	(4.609)	(3.150)
Observations	79	77	77	88	66	66	79
Number of clusters	30	30	30	31	26	26	30
Pseudo-R2	0.329	0.433	0.436	0.390	0.383	0.409	0.308
Log likelihood	-22.60	-18.90	-18.80	-20.22	-18.34	-17.56	-23.29
% correct predictions	86.1%	89.6%	90.9%	89.8%	87.9%	90.9%	92.4%

Note: Standard errors in parentheses. Significance levels are \*\*\* 0.01; \*\* 0.05; \* 0.10.

In terms of Hypothesis 3, in Table 3 we see a negative relationship between differential treatment and problem-solving effectiveness, which is however significant (at the 10% level) only in some of the regression models. This means that, while find support for the hypothesis that differential treatment reduces the likelihood that the agreement will be effective, this support is somewhat weak. Again, unexpectedly, provision of finance for the participation of developing countries in international

negotiations has a significant and negative effect on problem-solving effectiveness, which is robust to several specifications tested but not shown here. Such finding goes beyond Hypothesis 3 and is again difficult to explain. The theory in this paper is that differential treatment reduces effectiveness as it waters down environmental commitments in the regime, and as it creates additional incentives for benefitted countries to lobby for the continuation of privileges, reducing the ability of the regime to evolve in time and increase its scope. But this empirical finding refers only to the provision of finance for participating in negotiation meetings – it is difficult to explain why such provision of finance would reduce effectiveness – or even have an effect on it at all. Further research is needed to clarify this finding.

**Table 3: Effect of differential treatment on regime problem-solving effectiveness**

	(EFFECT1)	(EFFECT2)	(EFFECT3)	(EFFECT4)	(EFFECT5)	(EFFECT6)	(EFFECT7)
	Logit	Logit	Logit	Logit	Logit	Logit	Logit
	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors
different_categories	-1.083 (0.690)	-1.308 * (0.750)	-1.240 (0.789)	-1.365 (0.875)	-1.414 * (0.749)	-1.400 * (0.813)	
finance_devctys					-4.184 *** (1.573)		
finance_compensate						-0.761 (0.948)	
diff_obligations							-0.979 (0.931)
diff_implementation							-0.319 (0.732)
problem_understood	0.714 ** (0.320)	0.660 * (0.339)	0.648 * (0.347)	0.585 (0.357)	0.665 * (0.364)	0.829 ** (0.386)	0.529 ** (0.237)
malignancy	-0.0195 (0.149)	-0.00649 (0.154)	0.00120 (0.158)	0.117 (0.166)	-0.0625 (0.137)	-0.0184 (0.172)	-0.0510 (0.147)
powersetting_asymmetry	0.0601 (0.203)	0.0978 (0.197)	0.262 (0.343)	0.222 (0.302)	0.350 (0.256)	0.0513 (0.218)	-0.0200 (0.206)
ruleused_mode	-0.617 (0.586)	-0.305 (0.549)	-0.239 (0.546)		0.411 (0.685)	-0.930 (0.731)	-0.735 (0.532)
deep_rules		0.603 ** (0.269)	0.615 ** (0.260)	0.707 ** (0.292)			
rulebinding			-0.403 (0.587)				
compliance_managerial				-0.729 (1.028)			
Constant	-0.611 (1.862)	-3.015 (2.227)	-2.599 (2.438)	-4.334 ** (2.123)	-2.030 (2.222)	0.0329 (2.086)	0.392 (1.845)
Observations	99	97	96	104	86	86	99
Number of clusters	33	33	33	33	30	30	33
Pseudo-R2	0.103	0.172	0.174	0.181	0.363	0.169	0.0853
Log likelihood	-60.99	-55.32	-54.70	-58.62	-37.92	-49.46	-62.21
% correct predictions	66.7%	70.1%	68.8%	70.2%	80.2%	74.4%	66.7%

Note: Standard errors in parentheses. Significance levels are \*\*\* 0.01; \*\* 0.05; \* 0.10.

Again, the effect of differential treatment on problem effectiveness is quite substantial in real terms. Using the results of regression EFFECT2, when keeping all other variables at their means, the creation of different categories of parties to an agreement reduces the likelihood that the agreement is effective in solving the problem it seeks to address by 30%. In terms of the average marginal effect, having different categories of parties reduces the likelihood of an effective agreement by 26%. Graphs 10-12 in Appendix 7 show how the average marginal effect of *different\_categories* varies as the other variables in regression EFFECT2 adopt different values. The effect of differential treatment on the likelihood of being effective in changing the problem is more strongly negative for middle to high levels of understanding of the problem; it is slightly more strongly negative when the decision rule in use is more flexible (i.e. qualified majority instead of consensus or unanimity); and it is more strongly negative for medium levels of depth of rules. As the other variables in the model do not have a significant effect on problem effectiveness, they also do not affect the effect of *different\_categories*.

Going over to the control variables, a better understanding of the problem being addressed has no significant effect on the amount of states becoming party to an agreement, but it does accelerate their decision to ratify it. It also increases the likelihood that states will comply with the agreement, and increases the problem-solving effectiveness of the agreement. These results are all in line with expectations, and correspond to the findings by Breitmeier et al. (2011). They are robust to the different specifications tried. In some cases, the results lose statistical significance, which is partly due to the low number of observations in the analysis, but the direction of the effect never changes.

The malignancy of the problem being addressed has no clear effect on the amount of states becoming party to an agreement, but again it encourages states to ratify it more rapidly. Malignancy also reduces the likelihood that parties will comply with the agreement, but I do not find a significant effect on problem-solving effectiveness. These effects are robust in terms of their sign. While the first one goes against expectations (one would expect that it takes more time for parties to ratify agreements that address more complex problems linked to more incompatible interests, as it is likely that domestic opposition to such agreements is stronger), the negative effect on compliance is in line with findings by Miles et al. (2002).

All else equal, a higher power asymmetry between the negotiating states leads to a higher ratio of states becoming party to the agreement (unexpected), longer delays in ratification (expected), and a lower likelihood of compliance (but quite weakly significant). Particularly the last one of these results is in line with theoretical expectations expressed in Breitmeier et al. (2011).

Among the institutional variables, the depth of rules has a clearly consistent and significant positive effect on both compliance and effectiveness, which is also in line with previous findings, but has no clear effect on participation in the agreement. Whether the rules within an agreement are mostly binding or not seems to affect only the time taken by parties to ratify the agreement (by increasing it), but this result is only weakly significant. The type of decision-making rule has a consistently negative effect on the amount of states becoming parties to a regime, which might be linked to the fact that some agreements require approval by other parties before one new country joins, which with more stringent decision-making rules becomes cumbersome. It also has a negative effect on compliance with an agreement, but this effect is significant in only half of the regressions. A managerial approach to compliance does not appear to affect any of the dependent variables in a meaningful way.

#### **4. Conclusions and way forward**

Differential treatment of parties to international environmental agreements has become a common feature of international law. In this article, I propose three hypotheses about how such differential treatment may affect three different stages of regime implementation: ratification, compliance and problem-solving effectiveness.

The results found so far clearly indicate that differential treatment of parties to IEAs has an effect on regime implementation. Overall, they confirm the three hypotheses that were proposed at the beginning of the article. Despite the relatively low statistical significance in several of the regressions, which is likely related to the low number of observations in the sample, I find that differential treatment tends to improve the participation of states in IEAs, particularly in terms of the speed at which they ratify the agreement; I also find that differential treatment consistently improves the likelihood that parties comply with the provisions in IEAs; and I find that differential treatment consistently reduces the likelihood that IEAs are effective in solving the problem they are meant to address. As shown above, the size of these effects is quite substantial.

The results are most robust for one of the specifications of differential treatment: the existence of different categories of parties to the agreement, such as in the Climate Change Convention (Annex I parties with emission reduction obligations, non-Annex I parties without), in the Montreal Protocol on Substances that Deplete the Ozone Layer (Article 5 parties with a grace period to comply with obligations), in the Antarctic Treaty system (consultative parties with decision-making power and non-consultative parties without), or the International Tropical Timber Agreement (timber-producing and timber-consuming parties). Still, I also find that differentiation in terms of provision of finance for participation of developing countries in negotiation meetings, provision of finance for compensation of costs of implementing and complying with an agreement, and in terms of differentiated obligations for parties to the agreement also have significant effects in some cases. Only in the case of differentiation in the way obligations are to be implemented (e.g. through the provision of grace periods for compliance, softer compliance approaches, or flexibility for reporting), I never find statistically significant effects.

In addition, I find that the effect of differential treatment is contingent on other attributes of environmental agreements. These findings are useful for policymakers involved in negotiating and designing environmental agreements. For example, they mean that it is safe to introduce differential treatment – at least in the form of different categories of parties to an agreement – for environmental problems that are rather little understood, as in this case the positive effect on compliance is highest while the negative effect on actual problem change is lowest.

Some of the findings are unexpected. Parties to agreements that provide finance to compensate parties for the costs of implementation are less likely to comply with the requirements of the agreement. Agreements that provide finance to support the participation of developing countries in negotiation meetings have a lower likelihood of being effective in solving the problems they are meant to address. These findings merit further investigation, maybe through qualitative in-depth case studies that shed light into the causal processes for these relationships.

The findings of this study provide a good starting point for further analysis on the role of differential treatment of parties as a flexibility mechanism in IEA design. Empirically, the study is limited due to the low number of observations that can be used for analysis, which generally reduces significance levels of regression results, and which is particularly problematic in the case of logistic regression, as this type of



regression relies on maximum likelihood estimation and hence on asymptotic assumptions. In addition, some of the variables used so far are very coarse, as they average across parties to an agreement or across rules or problems addressed by it, and may not reflect the actual features being modelled. Furthermore, the IRD dataset is based on expert opinion. One may ask oneself, for example, whether an expert's assessment of whether an IEA has had a causal effect on problem solving is an objective measure of effectiveness. Finally, differential treatment is not always implemented in the same way. As exemplified in Appendix 1 and discussed in detail by Rajamani (2006), different IEAs have designed differential treatment in various ways, and these different designs may themselves be quite relevant for regime compliance and effectiveness. While with the coding of five different variables to reflect differential treatment I try to address this aspect, this may not be enough. For example, in the case of the climate change regime, quite rigid groups with and without commitments were established on the basis of fixed country lists. In contrast, in other cases, objective criteria were established under which countries would adopt commitments or not. The Montreal Protocol, for example, includes a clear criterion to define the countries with preferential treatment as those developing countries "whose annual calculated level of consumption of the controlled substances in Annex A is less than 0.3 kilograms per capita [...]"(UNEP 2000). The resulting expectation is that, if negotiators agree early on upon automatic 'graduation rules' from one group to the other, or upon attaching privileges to the relevant country characteristics rather than to fixed country lists, then potential negative effects of differential treatment upon long-term environmental effectiveness might be overcome.

Bearing these limitations in mind, hence, the next steps in this research project will be to refine the statistical analysis by performing at least some of the analysis at the country-level, which would allow me to increase the number of observations significantly and also to test hypotheses differentiating countries that benefit from differential treatment from countries that do not. In addition, to find answers to some of the puzzling findings so far, this statistical analysis will be complemented with a qualitative, more in-depth comparative analysis of some IEAs with different design features of differential treatment.

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## Appendix 1: Differential treatment provisions in some IEAs

IEA	Year signature / entry into force	Developing country parties (G77)	Industrialized country parties (OECD)	Other parties (EITs and others)	% of all countries	Type of differential treatment	Relevant text extracts (not exhaustive)
World Heritage Convention	1972 / 1975	128	30	31	95%	Context to implementation Financial assistance	Each party "will do all it can to this end, to the utmost of its own resources and, where appropriate, with any international assistance and co-operation, in particular, financial, artistic, scientific and technical, which it may be able to obtain."; "Any State Party to this Convention may request international assistance for property forming part of the cultural or natural heritage of outstanding universal value situated within its territory."
CITES	1973 / 1975	121	30	28	90%	Context to implementation Financial assistance	creates a Trust Fund "to provide financial support for the aims of the Convention"; while no country differentiation is explicit in the treaty text, most protected species are in developing countries
Vienna Convention	1985 / 1988	132	30	35	99%	Context to implementation Financial assistance Technology transfer	takes into account "the circumstances and particular requirements of developing countries"
Montreal Protocol	1987 / 1989	132	30	35	99%	Context to implementation Delayed compliance schedules Flexible base years Financial assistance Technology transfer	"Any Party that is a developing country and whose annual calculated level of consumption of the controlled substances in Annex A is less than 0.3 kilograms per capita on the date of the entry into force of the Protocol for it, or any time thereafter until 1 January 1999, shall, in order to meet its basic domestic needs, be entitled to delay for ten years its compliance with the control measures set out in Articles 2A to 2E [...]" "special provision is required to meet the needs of developing countries, including the provision of additional financial resources and access to relevant technologies"
Basel Convention	1989 / 1992	120	29	30	90%	Context to implementation Financial assistance Technology transfer Participation assistance	takes into account "the limited capabilities of the developing countries to manage hazardous wastes"; recognizes the need to "promote the transfer of technology for the sound management of hazardous wastes [...], particularly to the developing countries"
Basel Convention Ban Amendment	1995 / not yet	34	23	15	36%	Different central obligations Context to implementation Soft approach to non-compliance	"transboundary movements of hazardous wastes, especially to developing countries, have a high risk of not constituting an environmentally sound management of hazardous wastes" hazardous waste exports for final disposal and recycling are banned from Annex VII countries (EU, OECD and Liechtenstein) to non-Annex VII countries (all other parties)

IEA	Year signature / entry into force	Developing country parties (G77)	Industrialized country parties (OECD)	Other parties (EITs and others)	% of all countries	Type of differential treatment	Relevant text extracts (not exhaustive)
Convention on Biological Diversity	1992 / 1993	132	29	32	97%	Context to implementation Financial assistance Technology transfer Capacity building	"the provision of new and additional financial resources and appropriate access to relevant technologies can be expected to make a substantial difference in the world's ability to address the loss of biological diversity" "special provision is required to meet the needs of developing countries"
UNFCCC	1992 / 1994	131	30	34	98%	Different central obligations Context to implementation Flexible base years Delayed reporting schedule Financial assistance Technology transfer Capacity building Negotiation, participation and reporting assistance	notes "that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs"; "[...] the developed country Parties should take the lead in combating climate change and the adverse effects thereof"; "The specific needs and special circumstances of developing country Parties, [...] should be given full consideration"; "The developed country Parties [...] shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations [...]"
Convention to Combat Desertification	1994 / 1996	131	30	34	98%	Context to implementation Financial assistance Technology transfer Capacity building Participation assistance	"the high concentration of developing countries, notably the least developed countries, among those experiencing serious drought and/or desertification, and the particularly tragic consequences of these phenomena in Africa"; "the importance of the provision to affected developing countries, particularly in Africa, of effective means, inter alia, substantial financial resources [...] and access to technology, without which it will be difficult for them to implement fully their commitments under the Convention"
Kyoto Protocol	1997 / 2005	132	29	31	96%	Different central obligations Context to implementation Financial assistance Technology transfer Capacity building Negotiation and participation assistance Soft approach to non-compliance	"The Parties included in Annex I shall, individually or jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases listed in Annex A do not exceed their assigned amounts [...]"; "the developed country Parties and other developed Parties included in Annex II to the Convention shall [...] Provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in advancing the implementation of existing commitments [...]"

Source: Adapted and updated from Rajamani {Rajamani 2006\, p. 94-121.

## Appendix 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Description
ratio_parties	162	0.7101	0.2790	0	1	Ratio of parties to the agreement to max potentially relevant countries (IEA+IRD data)
years_to_ratify	162	8.3211	8.6341	0	41.3	Average amount of years that passed between finalization of the agreement and ratification/access by its parties (IEA data)
effect_compliance	120	0.8417	0.3666	0	1	The regime has had a positive causal effect on conformity with regime provisions (IRD data)
effect_problemchange	145	0.3931	0.4901	0	1	The regime has had a positive causal effect on improvement of problem addressed (IRD data)
different_categories	172	0.3123	0.4606	0	1	The agreement differentiates between categories of parties (IRD data & own coding)
finance_devctys	119	0.3193	0.4682	0	1	Does the financial mechanism support developing country participation? (IRD data)
finance_compensate	119	0.1597	0.3678	0	1	Does the financial mechanism provide compensation/subsidies for activities/compliance? (IRD data)
diff_obligations	172	0.1395	0.3475	0	1	The agreement differentiates parties with respect to central obligations (IRD & own coding)
diff_implementation	172	0.2326	0.4237	0	1	The agreement differentiates parties with respect to implementation (IRD & own coding)
problem_understood	168	2.7381	0.8907	1	4	Was the nature of the problem well understood? (IRD data)
malignancy	154	6.4935	2.2000	2	11	How malignant (complex and with incompatible interests) is the problem? (IRD data)
ruleused_mode	119	2.1008	0.5733	1	3	Decision rule most frequently applied in practice (higher = tougher) (IRD data)
powersetting_asymmetry	162	2.8395	0.9386	1	5	Were parties' power resources symmetrical or sharply different? (IRD data)
deep_rules	163	3.0184	1.1193	1	5	Is the regime shallow or deep as measured by the density and specificity of its rules? (IRD data)
rulebinding	157	2.6752	0.7181	1	3	Is the rule legally binding? (mode within case_id) (IRD data)
compliance_managerial	121	0.9008	0.3001	0	1	Do procedures reflect a management (rather than enforcement) approach to compliance? (IRD data)

### Appendix 3: Correlation table

	ratio_ parties	years_to_ ratify	effect_ com- pliance	effect_ problem- change	different_ categories	finance_ devctys	finance_ compen- sate	diff_ obliga- tions	diff_ imple- mentation	problem_ under- stood	malig- nancy	ruleused_ mode	power- setting_ asymmetry	deep_ rules	rule- binding	compliance_ managerial
ratio_parties	1															
years_to_ratify	0.1107	1														
effect_compliance	0.0310	0.1091	1													
effect_problemchange	-0.1039	0.1151	0.0884	1												
different_categories	0.0660	-0.1150	0.0270	-0.2932	1											
finance_devctys	0.3132	-0.2004	-0.1660	-0.4644	0.4644	1										
finance_compensate	0.0487	-0.3575	-0.2112	-0.3704	0.3704	0.2999	1									
diff_obligations	0.2830	-0.2175	-0.0648	-0.3703	0.3703	0.3403	0.6267	1								
diff_implementation	0.1162	-0.0580	-0.2002	-0.1271	-0.0625	0.4479	0.0377	0.1348	1							
problem_understood	-0.0193	0.1274	0.4027	0.2906	0.1514	-0.1452	-0.3776	-0.1158	-0.2472	1						
malignancy	-0.0545	0.2333	-0.4140	-0.1161	0.2227	0.1067	0.1623	-0.0024	0.2351	-0.1856	1					
ruleused_mode	-0.1776	-0.6089	0.0368	-0.0040	0.3824	0.1776	0.2259	0.1416	-0.4082	0.1762	-0.2588	1				
powersetting_asymmetry	0.0643	0.2681	-0.3731	0.1222	-0.0747	-0.0163	-0.1096	-0.2912	0.1419	-0.2081	0.5679	-0.3697	1			
deep_rules	0.0130	0.0555	0.2686	0.3984	-0.2541	-0.1208	-0.4911	-0.4347	0.1944	0.1855	-0.2321	-0.1496	0.1216	1		
rulebinding	0.2508	0.1959	0.0465	-0.0485	0.1246	0.1285	-0.2159	0.1024	-0.0260	0.2606	0.0714	-0.0745	0.3615	0.2769	1	
compliance_managerial	0.1902	-0.0380	0.2110	-0.1436	0.2842	0.1320	0.1679	0.1052	-0.2279	-0.1152	-0.1415	0.4421	-0.2748	-0.1112	-0.1159	1

#### Appendix 4: Baseline models: Determinants of regime compliance

	(BL1)	(BL2)	(BL3)	(BL4)	(BL5)
	Logit	Logit	Logit	Logit	Logit
	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors
problem_understood	0.761 *	0.731 **	0.763 **	1.651 *	0.637
	(0.395)	(0.361)	(0.382)	(0.863)	(0.520)
malignancy	-0.535 **	-0.441	-0.442	-0.437	-0.124
	(0.266)	(0.306)	(0.314)	(0.287)	(0.207)
ruleused_mode	-0.887	-0.717	-0.707	-0.986	
	(1.121)	(1.143)	(1.160)	(1.117)	
powersetting_asymmetry	-0.0438	-0.182	-0.125	-0.667	-1.192 *
	(0.444)	(0.541)	(0.563)	(1.024)	(0.712)
deep_rules		0.575	0.585	1.063	1.106 **
		(0.412)	(0.418)	(0.773)	(0.479)
rulebinding			-0.504		
			(0.493)		
compliance_managerial				2.896 *	-0.278
				(1.544)	(1.557)
Constant	5.513	3.376	4.533	-0.728	2.055
	(3.705)	(4.116)	(4.325)	(3.741)	(2.872)
Observations	79	77	77	65	88
Number of clusters	30	30	30	27	31
Pseudo-R2	0.215	0.255	0.260	0.472	0.346
Log likelihood	-26.43	-24.83	-24.67	-13.80	-21.70
% correct predictions	87.34	83.12	83.12	90.77	92.05

Note: Standard errors in parentheses. Significance levels are \*\*\* 0.01; \*\* 0.05; \* 0.10. These models replicate the regressions in Breitmeier et al. (2011), with slightly differently specified variables.



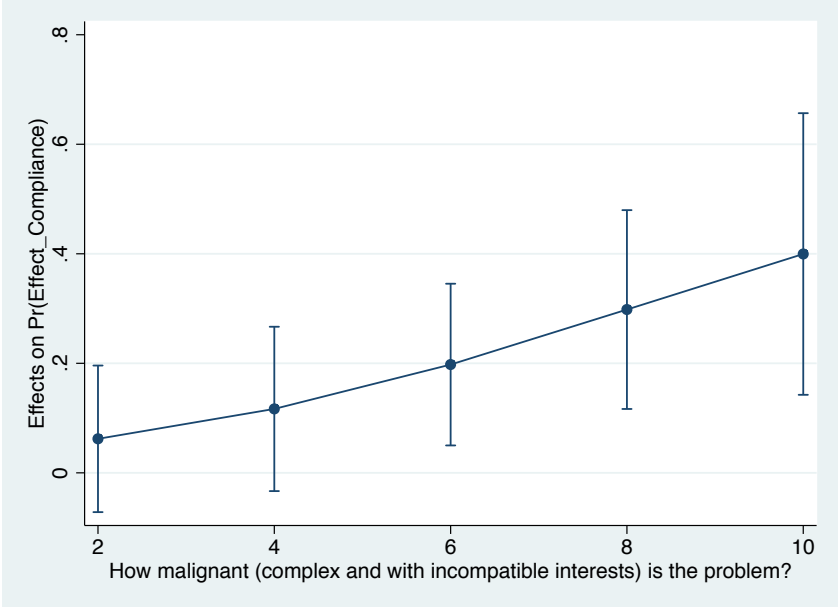
## Appendix 5: Baseline models: Determinants of regime problem-solving effectiveness

	(BL6)	(BL7)	(BL8)	(BL9)	(BL10)
	Logit	Logit	Logit	Logit	Logit
	clustered errors	clustered errors	clustered errors	clustered errors	clustered errors
problem_understood	0.555 ** (0.254)	0.472 * (0.281)	0.486 (0.305)	0.422 (0.316)	0.348 (0.320)
malignancy	-0.103 (0.142)	-0.0941 (0.158)	-0.0817 (0.160)	-0.134 (0.174)	0.00430 (0.176)
ruleused_mode	-0.717 (0.496)	-0.477 (0.476)	-0.393 (0.486)	-0.785 (0.508)	
powersetting_asymmetry	0.00831 (0.230)	0.00925 (0.207)	0.233 (0.316)	0.194 (0.234)	0.0858 (0.262)
deep_rules		0.539 ** (0.242)	0.568 ** (0.231)	0.499 * (0.267)	0.650 ** (0.276)
rulebinding			-0.543 (0.471)		
compliance_managerial				0.0586 (0.827)	-1.464 (0.932)
Constant	0.343 (1.770)	-1.587 (2.114)	-1.138 (2.245)	-1.014 (2.204)	-2.152 (2.015)
Observations	99	97	96	82	104
Number of clusters	33	33	33	30	33
Pseudo-R2	0.0666	0.124	0.131	0.132	0.143
Log likelihood	-63.48	-58.55	-57.53	-49.25	-61.37
% correct predictions	68.69	68.04	67.71	63.41	67.31

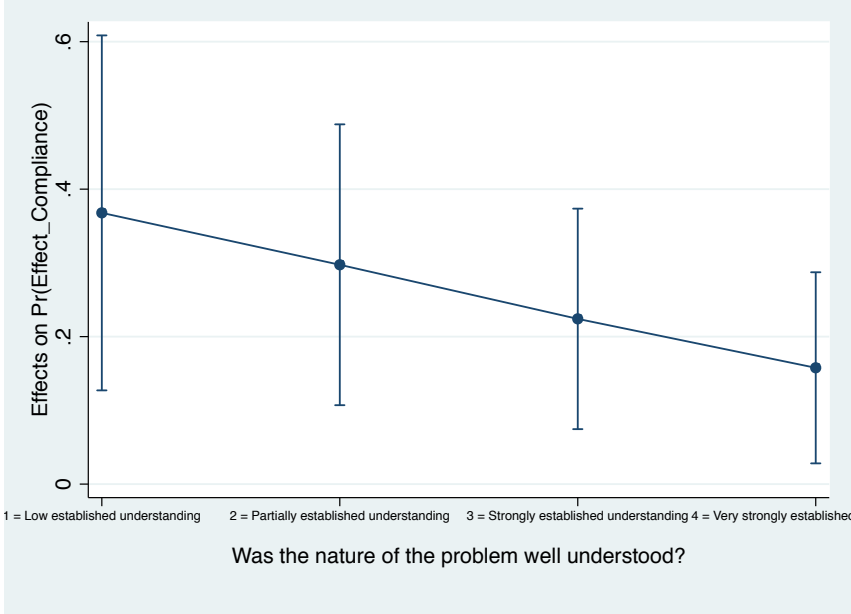
Note: Standard errors in parentheses. Significance levels are \*\*\* 0.01; \*\* 0.05; \* 0.10. These models replicate the regressions in Breitmeier et al. (2011), with slightly differently specified variables.

Appendix 6: Average marginal effects of differential treatment on regime compliance

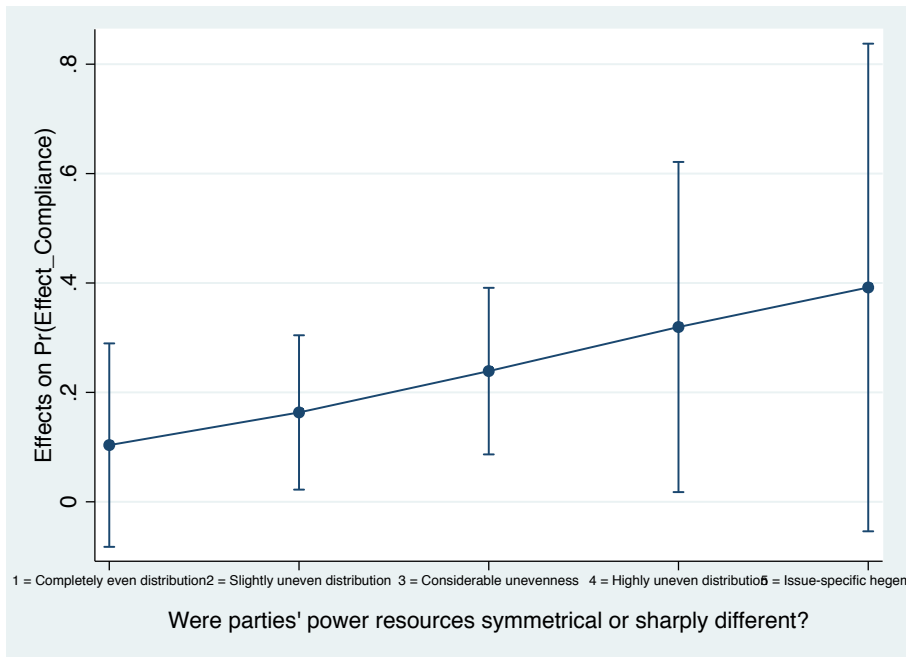
Graph 1: Effect of different categories of parties on compliance at different levels of malignancy of the problem



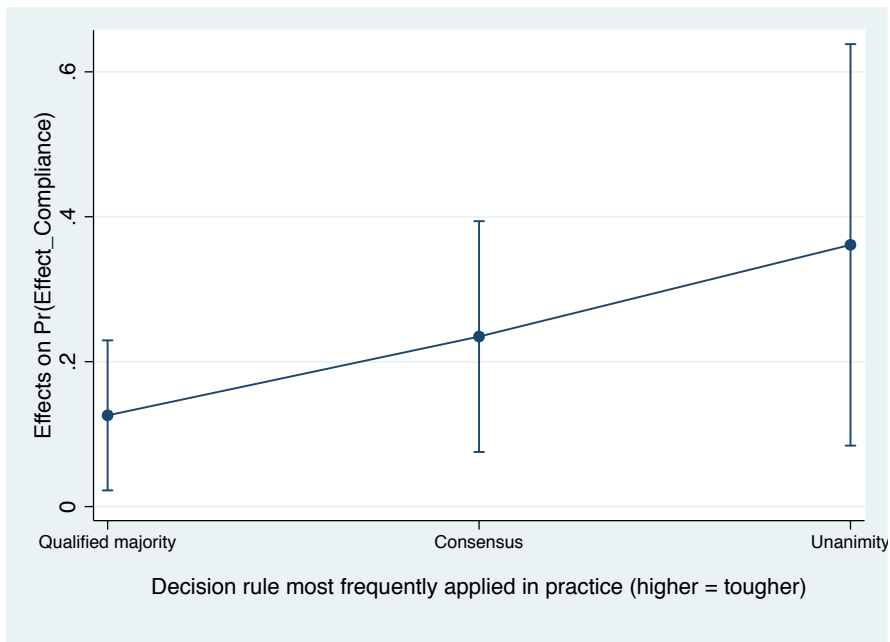
Graph 2: Effect of different categories of parties on compliance at different levels of understanding of the problem



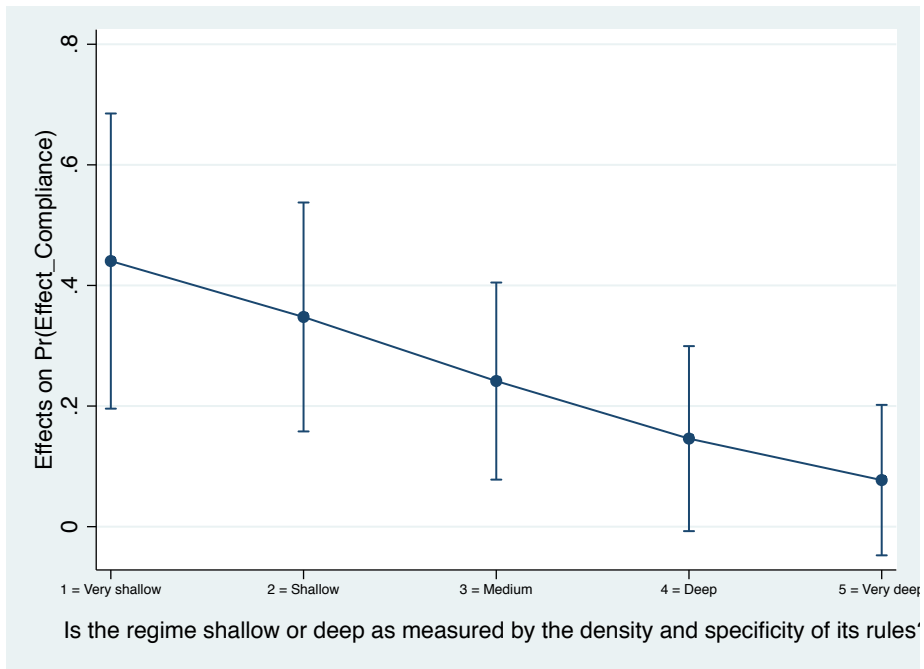
**Graph 3: Effect of different categories of parties on compliance at different levels of power asymmetry of parties**



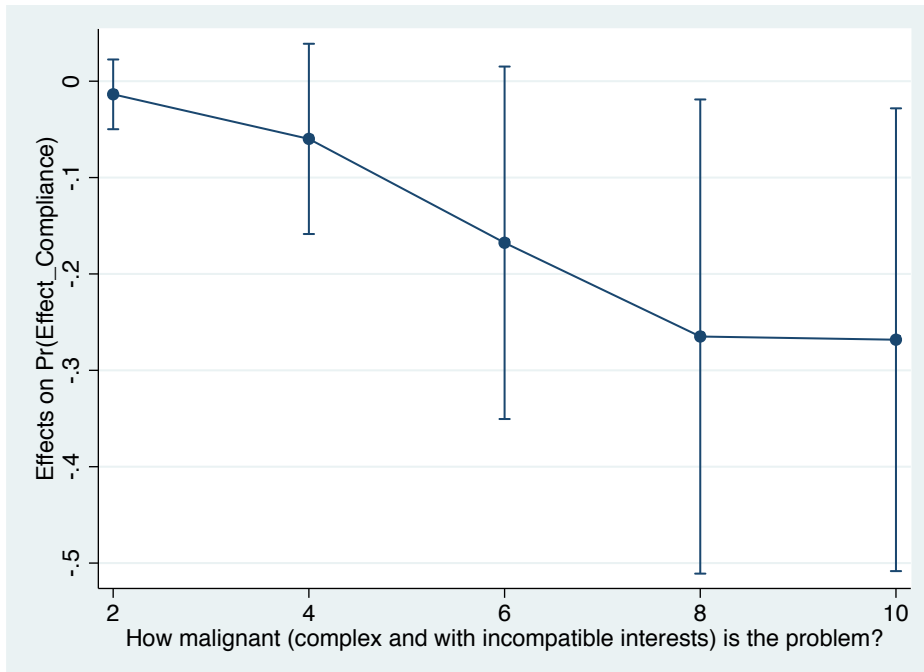
**Graph 4: Effect of different categories of parties on compliance depending on the type of decision rule in use**



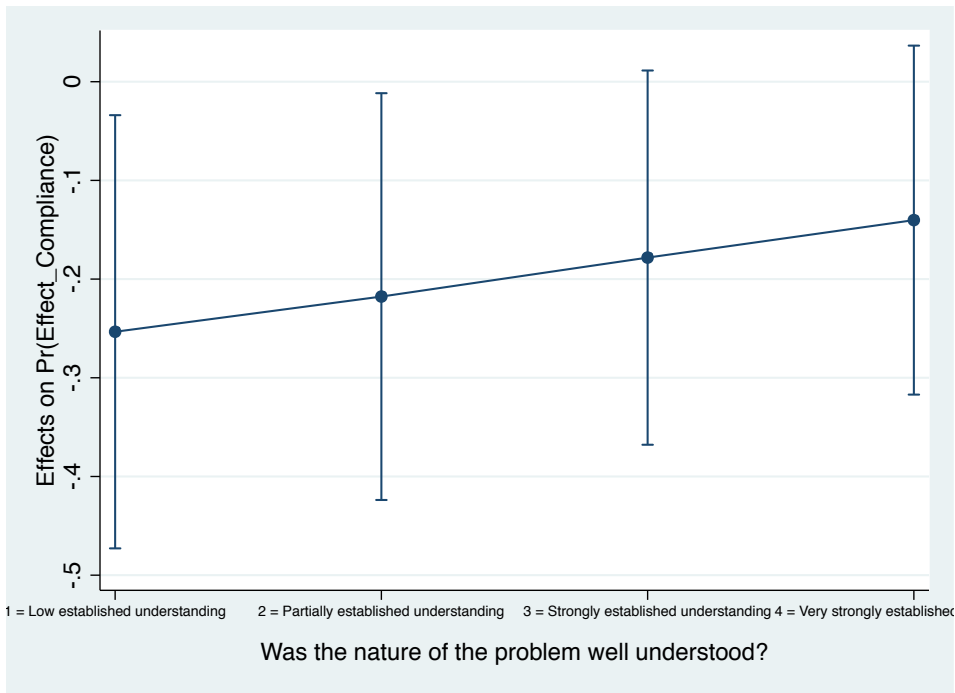
**Graph 5: Effect of different categories of parties on compliance at different levels of depth of rules**



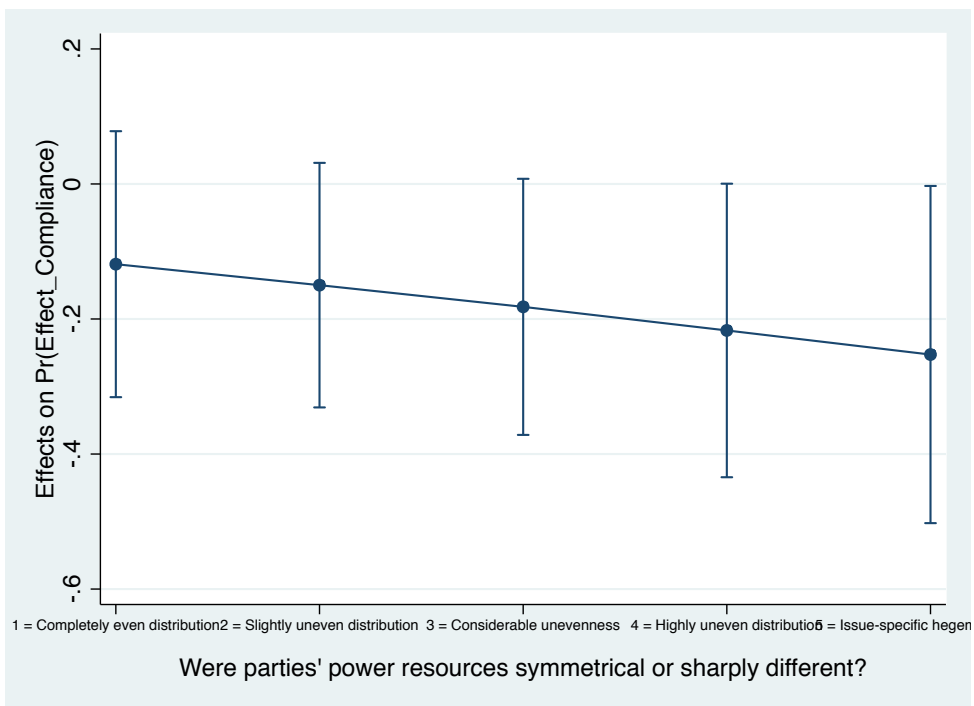
**Graph 6: Effect of provision of finance for compensation on compliance at different levels of malignancy of the problem**



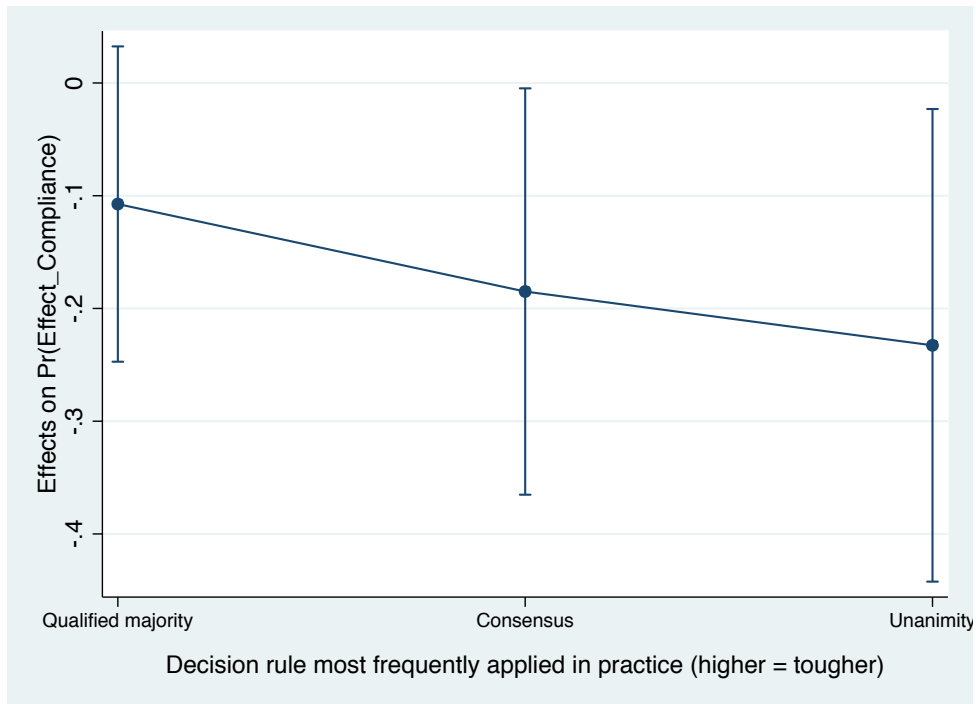
**Graph 7: Effect of provision of finance for compensation on compliance at different levels of understanding of the problem**



**Graph 8: Effect of provision of finance for compensation on compliance at different levels of power asymmetry of parties**



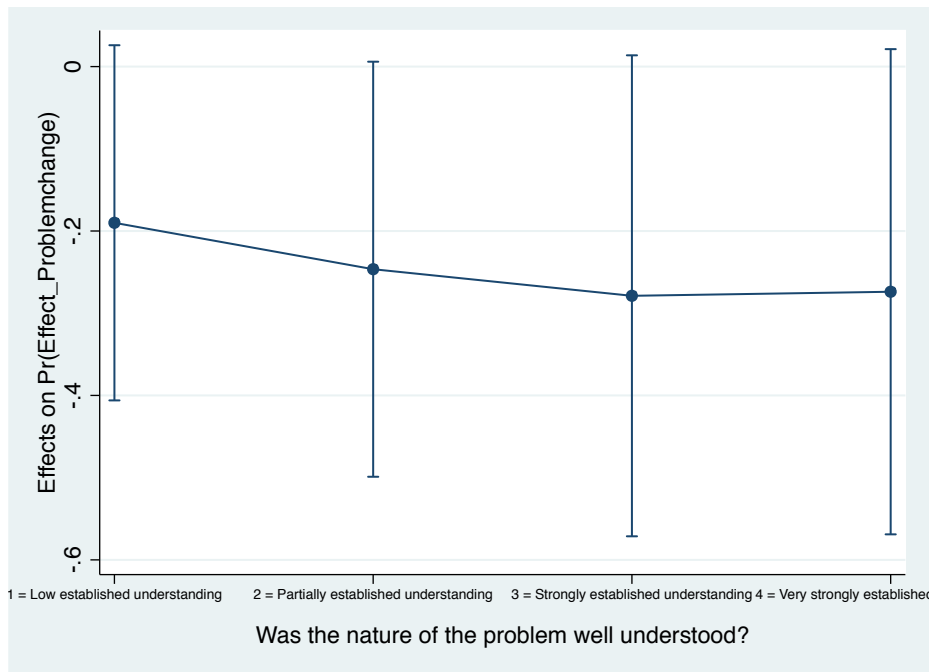
**Graph 9: Effect of provision of finance for compensation on compliance depending on the type of decision rule in use**



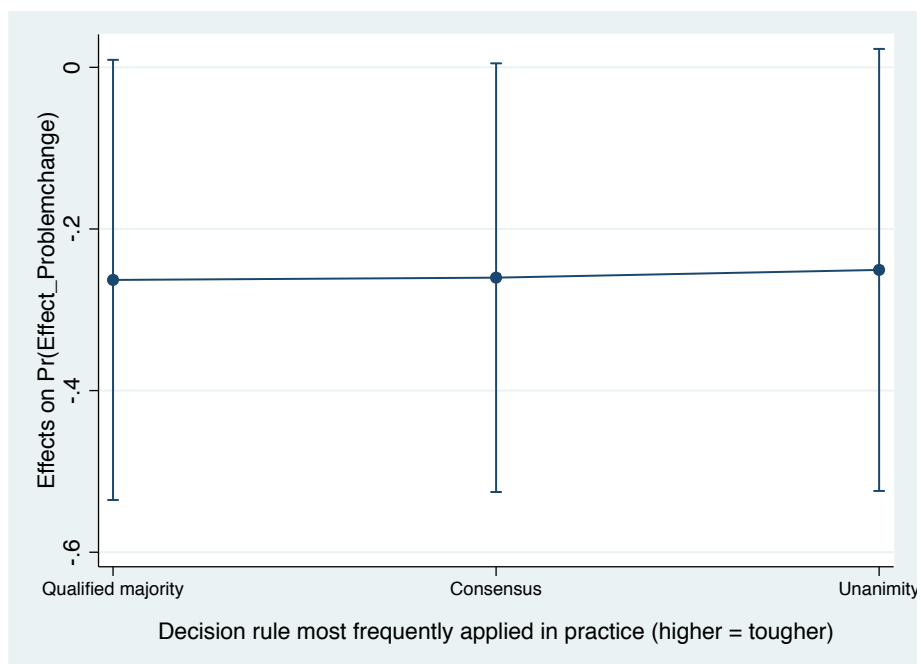
Note: Graphs 1-5 are based on regression COMPL2 in Table 2. Graphs 6-9 are based on regression COMPL6 in Table 2. Bars show the 95% confidence intervals.

Appendix 7: Average marginal effects of differential treatment on regime problem effectiveness

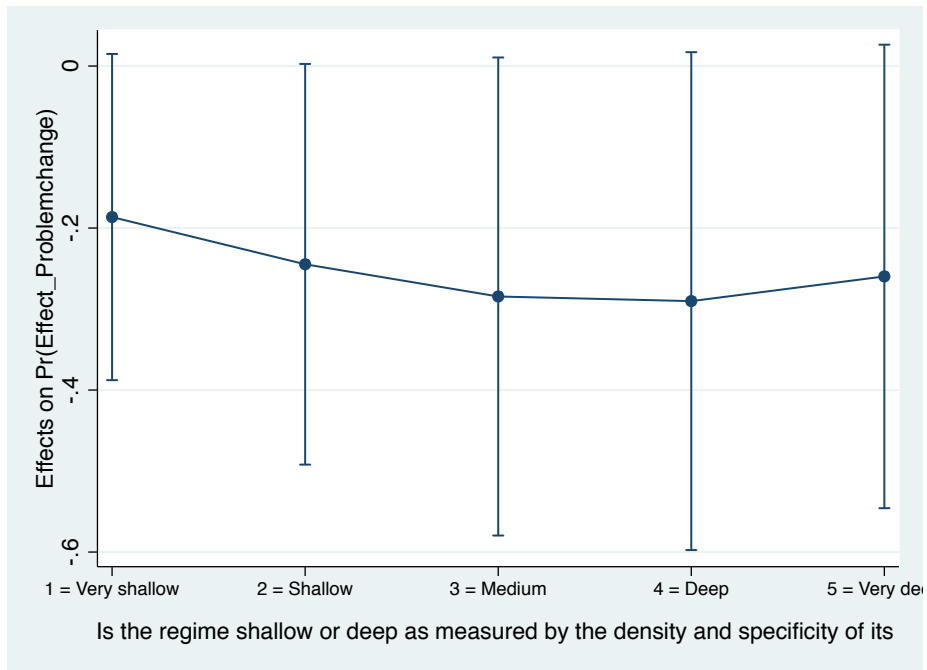
Graph 10: Effect of different categories of parties on effectiveness at different levels of understanding of the problem



Graph 11: Effect of different categories of parties on effectiveness depending on the type of decision rule in use



**Graph 12: Effect of different categories of parties on effectiveness at different levels of depth of rules**



Note: Graphs 10-12 are based on regression EFFECT2 in Table 3. Bars show the 95% confidence intervals.