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## **Path Dependence of Negotiation Structures in International Organizations: The Impact of Annex I Membership on Discussions within the UNFCCC**

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# **Path Dependence of Negotiation Structures in International Organizations: The Impact of Annex I Membership on Discussions within the UNFCCC**

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## **Abstract**

International organizations sometimes institutionalize country groupings by specifying differentiated rules and commitments that may, in turn, generate new negotiation dynamics. Drawing on psychological and incentive-based arguments, we develop a “constructed peer group” hypothesis suggesting that by creating these groups those organizations may actually construct new lines of confrontation over and above the substance-based disagreements existing between countries in the first place. This generates a particular type of path dependence rendering broad-based international agreements more difficult in the future.

We analyze this question at the example of the UNFCCC’s increasingly politicized split between Annex I and non-Annex I countries. Using a self-coded dataset of country statements during the negotiation rounds between December 2007 and December 2009 we assess whether Annex I membership influences a country’s stance towards other countries’ arguments. To disentangle the effect of group construction from the effect of various background characteristics that may drive countries’ preferences and, simultaneously, the affiliation to Annex I, we complement our regression analysis with quasi-experimental methods drawn from the treatment evaluation literature. We find that, over and above the ex ante differences in preferences, the split between Annex I and non-Annex I countries has indeed influenced negotiation behavior and thereby amplified the existing divide between developing and industrialized countries.

**JEL classifications:** F53, F55, C31

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## 1. Introduction

“Why shouldn’t I date an Annex I guy?” asked Leela Raina in an article written during the UN climate negotiations in Bangkok (Raina 2009). The Indian climate activist lists a couple of reasons: Annex I guys are not willing to commit, they usually take more space in the relationship, they refuse to finance dinners, they are possessive and want daily records and they have a consumption-oriented lifestyle.

With her article, Raina neatly captures a deep divide between developed and developing countries in international climate policy. Observers of the negotiation process believe that the United Nations Framework Convention on Climate Change (UNFCCC) has led to this split by listing OECD and transition countries in the so called ‘Annex I’ of the Convention, as a means of differentiating the greenhouse gas reduction and reporting commitments of these countries. They argue that over time, the distinction has become more and more politicized and rigid (see, e.g., Höhne 2005, p. 37).

The UNFCCC is not the only international organization that has adopted differentiated rules for groups of countries. In fact, several other 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 and the 1994 United Nations Convention to Combat Desertification, 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 of the future development needs of poor countries, of other special needs and circumstances of certain countries, and of the different contribution of countries to the specific environmental problem at hand. The resulting differential treatment usually consists of less stringent obligations, different timing of the application of provisions (grace periods or delayed implementation of obligations, or priority implementation in specially affected countries), and international assistance in terms of financing, capacity building or technology transfer (Matsui 2002, Hepburn and Ahmad 2005).

Another notable example is the World Trade Organization with its “Special and Differential Treatment” provisions, which are based on the notion that countries at different levels of development have different trade policy needs (Page and Kleen 2005). The 1979 Enabling Clause formally established differential treatment for developing countries and, among them, for Least Developed Countries (LDCs). In recent negotiation rounds on specific trade areas, however, different sub-groups of developing countries, according to different criteria, have been granted preferential treatment. In this context, it has been noted that the existing country categories have become rigid and are being considered as negotiation goals themselves. As a result, there has been a discussion about how to make this differential treatment more flexible and dynamic and how to establish differentiation categories and graduation rules to allow this flexibility (see, e.g., Hoekman et al. 2004, Kasteng et al. 2004, Page and Kleen 2005, Hoekman and Özden 2006).

In this paper, we propose a “constructed peer-group” hypothesis, whereby the “constructed” peer group is itself a result of the negotiation process, and stands in contrast to a “natural” peer-group based on country characteristics that lead to similar preferences and natural coalitions. Our hypothesis suggests that once these groups are constructed and institutionalized, divisions between countries may follow the delimiting lines between these

groups. More specifically, we expect that the group building process itself alters the countries' incentives, and, as a consequence, their negotiation behavior. For instance, countries in groupings initially granted certain exemptions from economic or financial adjustment obligations will have an incentive to jointly lobby for the continuation of this preferential treatment in subsequent negotiation rounds, whereas countries with such obligations will feel encouraged to lobby for the abolition of the preferential treatment. In addition, country groupings may imply increased discussions within these groups and thereby enhance mutual understanding and support, accentuating a group profile that may, in fact, have been relatively flue in the first place. Eventually, the decision to form specific country groups may drive the discussions in a different direction than they would take otherwise (path dependence) and render broad-based international agreements even more difficult.

This paper will use the example of the UNFCCC to assess to what extent the ex ante categorization of member countries may indeed amplify the divide between them. The empirical challenge is to differentiate between the effect of institutionalized groupings and the impact of policy preferences that can be explained by different country characteristics. To do so, we examine the factors leading countries to openly express support for other countries' positions during the UNFCCC negotiation rounds from December 2007 to December 2009. Based on protocols of the negotiations published in the Earth Negotiations Bulletin (ENB), we code all statements by countries declaring support for other countries' previous interventions. We then assess the impact of Annex I membership and various country characteristics on this variable in a multivariate censored regression framework. Moreover, we complement this analysis by an econometric evaluation using propensity score matching. As a fully non-parametric method this estimation strategy is independent of functional form assumptions. In addition, the matching approach limits our comparison to actually comparable countries – thereby eliminating a potentially important source of bias.

The idea that institutionalized groupings may influence the further negotiation process already exists among observers of the climate change negotiations, and the implications of being included in one or the other group have been discussed already (in addition to the literature mentioned above, see also Baumert et al. 1999 and 2002; and Gupta 2010). Furthermore, the normative perspective about why country differentiation should be pursued and how this should be done has been examined from a legal point of view (e.g, Rajamani 2000). However, we are not aware of any systematic theoretical and empirical assessment of the effects of institutionalized country differentiation on the future negotiation process itself. This may be related to the lack of a theoretical framework to explain such effects, and to the lack of appropriate data. This paper now proposes some theoretical ideas on why institutionalized groups may affect the negotiation process. Moreover, it provides an empirical test of the “constructed peer group hypothesis” based on a new data set generated through extensive coding of ENBs.

In the following, we will first describe the context of our UNFCCC example (Section 2). In Section 3 we then propose a theoretical framework describing our “constructed peer-group” hypothesis and linking it to existing psychological and incentive-based arguments from a broader literature on cooperation and international negotiations. This hypothesis is assessed based on data described in Section 4. Section 5 explains the empirical estimation approach and presents the results of our analysis. Section 6 completes the paper with the main conclusions and a discussion of policy implications for international negotiation processes in general.

## 2. Setting the scene: Different countries, different rules – the background of Annex I

The ultimate goal of the UNFCCC is the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner” (UNFCCC 1992, Art. 2).

In Article 4 of the Convention, all countries commit to publish inventories of greenhouse gases (GHGs), as well as national measures taken in order to mitigate or adapt to climate change. They agree to cooperate in technology development and transfer, in the management and conservation of GHG sinks<sup>1</sup>, in adaptation, and in research and education related to climate change (UNFCCC 1992, Art. 4.1).

In addition to these general commitments of all UNFCCC member countries, the Convention stipulates additional efforts for those countries which, in 1992, were recognized as historically responsible for most of the emissions and wealthy enough to bear the bulk of the greenhouse gas mitigation costs. Accordingly, the Convention’s first guiding principle is “common but differentiated responsibilities”:

*“[...] the developed country Parties should take the lead in combating climate change and the adverse effects thereof.”* (UNFCCC 1992, Art. 3.1)

The developed countries supposed to take the lead – basically the then OECD members plus selected countries of the former Soviet Union – were listed in Annex I of the Convention (for the individual countries, see Figure 1). Article 4.2 of the Convention defines the objective of returning CO<sub>2</sub> emissions of Annex I countries to 1990 levels by 2000. The Kyoto Protocol in 1997 led to additional binding targets for a list of countries that widely corresponds to UNFCCC, Annex I (Annex B of the Kyoto Protocol).<sup>2</sup> A subset of Annex I countries further agreed to provide financial support to developing countries to assist them with their reporting requirements, provide technology transfer and contribute to adaptation processes in particularly vulnerable countries, e.g., small island countries (UNFCCC 1992, Art. 4.3).

While some procedural mechanisms for regular revisions of Annex I were foreseen within the Convention, there was no in-built graduation principle related, e.g., to per capita income or emission levels. Correspondingly, there has been little change over time. A few European countries joined Annex I in 1997 when they joined the Convention: the Czech Republic and Slovakia – replacing Czechoslovakia, as well as Croatia, Liechtenstein, Monaco, and Slovenia (UNFCCC 2000). Otherwise, changes of the country list in Annex I have proven to be extremely contentious. No move between non-Annex I and Annex I has ever taken place so far. In 1998 Argentina and Kazakhstan proposed to take up emission targets (thereby joining Annex I), but this was prevented through the fierce opposition of other developing countries. The latter feared that this would generate a precedent eventually leading to commitments for developing countries (Grubb 1999, pp. 251f.).

In subsequent years, the distinction between Annex I and non-Annex I countries became more and more rigid (Höhne et al. 1997, p. 9, Höhne 2005, p. 37). Contentious issues such as the financing of mitigation and adaptation in developing countries, further reporting

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<sup>1</sup> ‘Sinks’ are natural carbon stores that sequester carbon from the atmosphere (forests, soils and oceans).

<sup>2</sup> While the US is listed in Annex B, it did not ratify the Protocol. Turkey is the only Annex I country that ratified the Kyoto Protocol, but, for exceptional reasons, is not included in Annex B (UNFCCC n/d).

requirements, the accounting of avoided deforestation, and the adoption of future commitments, all were discussed along these lines. As Gupta (2010, p. 641) describes it, “the division of the world into developed and developing (based on OECD membership) was amateurish—there were no clear criteria for this division, and this has proved to be a major stumbling block in subsequent periods as countries resisted their inclusion in Annex I (e.g., Turkey) or are reluctant to change their status subsequently”.

Thus, initially, listing countries in Annex I was meant to be used only as an interim vehicle to differentiate the emission reduction and related reporting commitments. However, in practice it may have created a lasting divide between two static country groups.

In the framework of international climate negotiations, a number of other country groups have become relevant, too. As opposed to Annex I, these groups are not defined by the Convention itself. Their main purpose is to exchange information between like-minded countries, to increase their negotiating power by expressing joint positions, and to ease the burden of small and / or poor countries that may not be able to send a sufficient number of delegates to be represented in all the different negotiation groups for discussing the different policy issues at stake. In some cases, such groups have reached special treatment for particular policy issues. Both the Least Developed Countries (LDCs) and the group of Small Island Developing States (SIDSs) are explicitly recognized as particularly vulnerable to the impacts of climate change, and thus enjoy certain specific provisions. For instance, there is a special seat being reserved for SIDSs on the Executive Board of the Clean Development Mechanism (CDM), or a waiver of registration cost for CDM projects in LDCs.

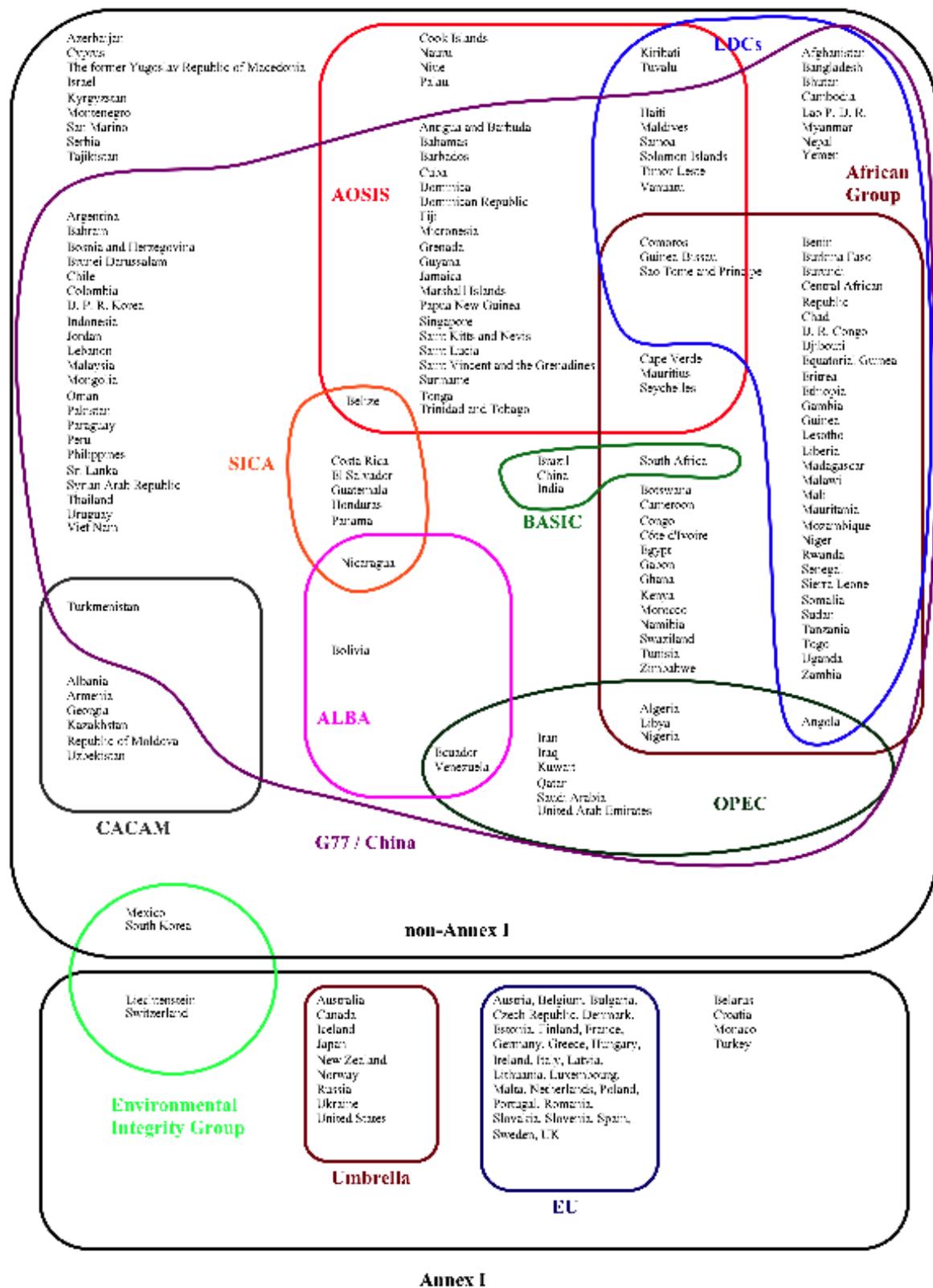
Some of these groups are well-established regional or political country groupings such as the EU, the G77 and China, OPEC or the LDCs that also act as groups in other international fora. There also are an African group, a Central Asian group (CACAM) and two Latin American groups, the Bolivarian Alliance of Latin American Countries (ALBA) and the Central American Integration group (Sistema de Integración Centroamericana, SICA), whereby the former is based on ideological, the second on geographical grounds. Other groups have formed specifically in the climate negotiation process, driven by joint interests in this field, such as the Alliance of Small Island States (AOSIS<sup>3</sup>), a group of the large emerging countries Brazil, China, India and South Africa (BASIC), or the Umbrella group – an alliance of industrialized countries in favor of market based mechanisms rather than regulation.

While there are a large number of (partially overlapping) groups within non-Annex I, and also a few groups within Annex I, only a single (small) group bridges the gap between these two. This is the Environmental Integrity Group composed of South Korea, Mexico, Liechtenstein and Switzerland. An overview of all the different groups is provided in Figure 1.

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<sup>3</sup> AOSIS is an ad hoc negotiating coalition that represents the interests of SIDSs. While both groups are very similar, they are not identical: the UN list of SIDSs includes Bahrain and several non-UN members and associate members of the regional commissions that are not members of AOSIS.

**Figure 1: Country coalitions within the UNFCCC**



We consider these groups (other than Annex I or non-Annex I) as natural coalitions that have been built due to pre-existing common interests or characteristics of their member countries.<sup>4</sup> As such, they are not relevant for our “constructed peer-group” hypothesis, which tries to explain the effect on the negotiations of groups that have been created by the regime itself. However, since in the negotiation process many countries – especially the smaller ones – tend to express their opinions through the coalitions they are member of, rather than through statements of their own, all these coalitions are of high relevance for the analysis of the negotiation process. When assessing the determinants of supportive statements among participants of the negotiation process in later sections of this paper, we will therefore include these country coalitions as additional observations. Technically, we will treat them as if they were additional countries with characteristics (income, emissions, etc.) derived from the values of their member countries. We do this because we assume that these coalitions will represent the preferences of their members, and that these preferences are best summarized by the mean of member country characteristics.

Before we get to the empirical analysis, however, we need to provide a theoretical framework for our analysis. In the following section, we will therefore outline our “constructed peer-group” hypothesis on how institutionalized country groupings may influence the negotiation process. To motivate this hypothesis, we will draw on more general theories related to incentives and psychological motivations for cooperation.

### **3. Why institutionalized groupings could affect the future negotiation process: the constructed peer-group hypothesis**

Clearly, country characteristics and related preferences affect the positions they will take up in the negotiation process, the statements they will approve of, and, eventually, the outcomes of the negotiation process. Countries within distinct groups usually share a certain number of economic, political or geographical characteristics, and these similarities lead to common positions on certain aspects of the policy issues at stake.

Our theoretical idea now is that, over and above the effect of similarities in country characteristics and related preferences, the existence of institutionalized country groupings may have an effect of its own. We call this the “constructed peer-group” hypothesis. The construction of these groups by the regime itself (in contrast to the natural coalitions described above) results in new commonalities among their member countries, which lead to a group identity similar to that of a peer group. This in turn affects the negotiation dynamics, and leads eventually to the persistence of these constructed groups, even for other purposes than those intended initially. We thus expect path dependence between initial institutional decisions and later negotiation structures and dynamics. In the climate change context, it seems that the creation of the Annex I list of countries with specific emission reduction and reporting commitments, and the emergence of the non-Annex I group without them, have made subsequent negotiation rounds reinforce the differences between these two groups more and more across different policy areas.

Our hypothesis is based on theoretical considerations about how groups behave in negotiations or similar situations, and about how the creation of new groups generates new incentives which, in turn, influence negotiation dynamics. We consider three arguments that

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<sup>4</sup> In the interest of clarity, we will continue to use the term “coalitions” when we further refer to these groups, while the term “groups” will be confined to Annex I and non-Annex I.

back up our hypothesis: (i) group psychology, (ii) a changed negotiation structure resulting from the existence of groups, and (iii) new incentives created by the new groups. Note that we do not seek to assess the relative importance of any of these arguments. Rather, we consider that all of them can motivate our constructed peer-group hypothesis, and it may well be that all of them are similarly relevant for the phenomenon at hand.

*(i) Group psychology*

Countries in a given group will meet more often and exchange positions. As they already share some common characteristics, they will feel more closely related. The reduced number of participants also facilitates the creation of personal relationships between country representatives and the emergence of social capital (Coleman 1990; Schimmelfennig et al. 2006). In the words of Mantzavinos et al. (2004, p. 76): “individuals in a given sociocultural environment continually communicate with other individuals while trying to solve their problems. The direct result of this communication is the formation of shared mental models”, which lead to a common understanding of reality. Through experiments, social psychologists have indeed shown that group discussion increases the chances of cooperation (Orbell et al. 1988). Researchers of intergovernmental organizations (IGOs) also argue that membership of IGOs creates network ties between countries, provides communication channels that allow them to share information about interests and intentions, and generate a sense of mutual identity that leads to cooperation (see e.g. Keohane 1986; Caporaso 1992; Russett et al. 1998; Young 1999; and Dorussen and Ward 2008).

This all induces a more trustful atmosphere conducive to fruitful deliberations. Consensus will be found more easily within smaller groups than within UNFCCC members as a whole. Once a group exists, one may thus expect that these factors reinforce cohesion among members, and a unified group position is likely to emerge. If, in addition, the group is challenged from the outside, questioning the very foundations and the “raison d’être” of the group, this may even further weld together its members.

The smaller the group and the clearer the similarities of members’ preferences at the outset, the stronger should be these effects. This is in line with Mantzavinos et al.’s (2004) argument that trust is more likely to exist in smaller groups than in larger societies, and with Olson’s (1971) theory that smaller groups are more able to organize for tackling collective action problems.

A coalition like AOSIS including only countries that are extremely vulnerable to climate change, appears to be a good example. At the same time, the arguments also appear plausible for bigger and less homogeneous groups, even if the effects may be somewhat reduced: The creation of Annex I artificially split UNFCCC members into two distinct groups: Annex I and non-Annex I countries. It thereby generated two separate fora for discussion in addition to the already existing ones. Since non-Annex I countries enjoy some privileges (no own commitments, external funding for their own mitigation and adaptation activities), their status has been challenged repeatedly in the past. This resulted in a strong response by the group as a whole. The above mentioned developing country resistance against Argentina or Kazakhstan’s proposed move from non-Annex I to Annex I is a key example. More generally, Leela Raina’s statements on reasons “not to date an Annex I guy” (quoted in the introduction of this paper) neatly show the psychological and ideological divide which has emerged between the two groups.

### *(ii) Changed negotiation structure*

Ever since Downs' (1957) seminal work on the "Economic Theory of Democracy", it has been well established in both political science and economics that the electoral system influences the positions adopted by political parties. Within Downs' model itself, it can be shown that the voting process will no more lead to the adoption of the median voter position, if, prior to the general election, the party positions have to be accepted by a majority of the party members – at least if these members are not evenly distributed over the policy space, but clustered at two different ends due to ideological preferences. In this context, the party positions adopted will typically lie around the median position within each party, rather than at the median of the overall population. During the general elections, voters will then be confronted with two distinct party propositions, and one of these will eventually be accepted. As opposed to the median voter scenario, this outcome will correspond to the preferences of some voters on one or the other side of the ideological spectrum, rather than to the intermediate preferences of the median voter.

Group-wise discussions in international negotiation processes can be conceived as analogous to primary elections within parties, where instead of party members we have the countries belonging to a specific group, and instead of parties we have the groups themselves. Institutionalized groupings thus affect the structure of the negotiation process. Rather than having all participants deliberate jointly about the issues at stake, the formation of opinions then happens at an earlier stage within the different groups. If these groups are clustered around different positions in the policy space, and if group discussions in the first stage lead to relatively fixed positions fed into the overall negotiation process in the second stage, reaching consensus there will become much more difficult.

Just as the discussion on group psychology, within the UNFCCC this argument refers to all groups in a similar way, and is especially relevant for the regional or political coalitions such as AOSIS or the G77, who hold regular meetings to coordinate positions during the negotiation rounds. However, again, the formation of new groups such as Annex I and non-Annex I can amplify the effect, simply by increasing the total number of groups.

### *(iii) New incentives*

New incentives are generated when group formation goes hand in hand with specific privileges attached to group membership. For all members of the group, the protection of these privileges becomes a new and common objective. For instance, groupings initially granted certain exemptions from economic or financial adjustment obligations will have an incentive to jointly lobby for the continuation of this preferential treatment in subsequent negotiation rounds, or for the expansion of the preferential treatment to other issue areas. New incentives can also work in the opposite direction: countries in the group with financial or environmental obligations will lobby for the abolishment of the preferential treatment, or for increased flexibility for fulfilling their commitments. In both cases, the common objective strengthens cohesion within the group.

While within the UNFCCC group psychology and the changed negotiation structure were relevant for all groups and the creation of the Annex I – non-Annex I distinction simply amplified their number, new incentives only arose in the context of Annex I – non-Annex I. This is because membership in Annex I was linked, from the beginning, to specific responsibilities and duties while non-membership was linked to privileges. For non-Annex I members, this created new stakes, the idea that concessions obtained at one point should not

be weakened, and thus the incentive to fight for the perpetuation of the status quo (Gupta 2010). This fight takes place by the group as a whole since the demand for the change in status of individual non-Annex I countries is perceived as a threat for many others. They fear that any weakening of the once-defined dividing line between countries with and without commitments will pave the way for further pressure on developing countries, for requests with respect to more and more countries taking up commitments, and eventually, for a suppression of the principle of common but differentiated responsibilities.

Again, resistance against Argentina or Kazakhstan's proposed move from non-Annex I to Annex I could be quoted here as an example. Another example is the deadlock of negotiations about mitigation commitments for China. No serious discussion has been possible in this area so far, despite the fact that, ever since 2007, China has the highest CO<sub>2</sub> emissions of any country in the world (Netherlands Environmental Assessment Agency 2008), and despite China's steadily rising level of per capita income that will soon reach the level of the poorer countries in Annex I (e.g., the Ukraine) (World Bank 2009). A further example from the recent negotiation dynamics is the fierce defense, by non-Annex I countries, of the continuation of the Kyoto Protocol that sets binding emission reduction commitments only for the developed countries, in contrast to the preference of these last ones for a complete new protocol with a larger set of countries taking on commitments (see e.g. Rajamani 2009 and Reuters 2010).

Our incentives argument also goes in the direction of North's (1994) theories on institutional change and path dependence. He argues that the "political and economic organizations that have come into existence in consequence of the institutional matrix typically have a stake in perpetuating the existing framework" (p. 7), due not only to the fact that actors rationalize the existing institutional framework and thus favor policies that keep it in place (the mental models of Mantzavinos et al., op.cit.), but also because of complementarities, economies of scope, network externalities, and the own interests of the existing organizations. As Pierson (2000, p. 255) points out, "Established institutions generate powerful inducements that reinforce their own stability and further development".

Finally, the theory of stability of coalitions further substantiates our incentives argument: Incentives for free-riding in treaties dealing with the provision of public goods (such as pollution abatement) increase as the size of the coalition increases, because the opportunity costs of not abating grow (e.g. Eyckmans and Finus 2007). In our case, once the Annex I group of countries with abatement obligations was established, and in the absence of rules for graduating into this group automatically, no single country has an incentive to join Annex I and commit to reducing emissions, because its individual costs of abatement are larger than the mitigation benefits it derives from committing.

We have now shown the different channels through which the creation of institutionalized groups may affect the dynamics of the negotiation process. While the group psychology and the negotiation structure argument should be relevant for all groups, including regional or political coalitions, the new incentives argument is relevant only in the context of Annex I / non-Annex I. Only there, new stakes have been generated along with the creation of the group.

These additional stakes which generate a new unifying objective are important for the empirical identification of the group effect as opposed to the effect of country characteristics and related preferences. As long as group building only generates stronger cohesion among countries anyway linked by homogeneous preferences, the impact of the group itself will be difficult to identify. The definition of Annex I, however, has generated two groups that are not

overly homogeneous, so that we find some overlap in the relevant country characteristics between the two groups (see e.g. Gupta 2000 for a detailed description of the differences and commonalities among developing countries in the climate regime). While membership of Annex I (and non-Annex I) was not randomly selected, but rather decided in terms of greenhouse gas emissions levels and levels of economic development, these two groups are themselves not homogeneous in many respects, including individual countries' greenhouse gas emissions, income, or vulnerability to climate change (see Table 2 for a comparison of country characteristics between Annex I and non-Annex I). This heterogeneity results in varying interests and preferences regarding the climate regime within each group. Yet, based on the above theoretical arguments, we hypothesize that the preferential treatment of non-Annex I countries has generated a strong common objective for all these countries that opposes them to Annex I, and vice versa. This makes countries within each group overcome their differences in preferences in order to reach a stronger negotiation position in pursuit of the common goal of keeping (or eliminating) the preferential treatment. Using an appropriate econometric estimation approach should enable us to observe this distinct “constructed peer-group” effect suggested in our theoretical analysis.

#### 4. Data and variables

In order to test whether Annex I membership plays a role – over and above country characteristics and related preferences – for countries' negotiation behavior, we need to define both, our understanding of “negotiation behavior”, and the relevant country characteristics.

Negotiation behavior encompasses many different aspects of deliberation and strategic action in the negotiation process. To be able to handle the concept in our empirical analysis we narrow it down to one measurable dimension: statements by countries declaring support to other countries' previous statements. We assume that openly expressing support for a country's previous statements indicates closeness in terms of negotiation positions.

To generate the corresponding variable, we hand-code the negotiation reports published in the Earth Negotiations Bulletins (ENB) (International Institute for Sustainable Development, IISD 2007-2009) for the UNFCCC Conferences of the Parties (COPs) and intersessional negotiation meetings from December 2007 to December 2009. The ENBs provide very detailed daily reports of the negotiations. For all meetings that are open to observers, the reports contain summaries of statements made by the different countries, and of reactions by others. Our variable on statements by country  $i$  supporting country's  $j$  positions is a dummy that is coded 1 whenever a country is reported to ‘support’ another country's statement, to ‘associate itself’ with this statement, to say something “with” another country, or to even ‘speak on behalf’ of another country.

As an example, a passage on the ENB reporting the negotiations on 5<sup>th</sup> June 2008 says “The EU, supported by JAPAN, proposed a pilot phase approach” (on carbon, capture and storage). To create the dependent variable that measures support for the EU, we code this unit of text as 1 in terms of support by Japan for the EU. We do the same for the negotiations between December 2007 and December 2009, so that we have a variable counting how many times Japan (and each of the 200 “countries”<sup>5</sup> participating in the negotiations) expressed support

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<sup>5</sup> As explained in Section 2, countries are complemented by coalitions in our list of observations. For simplicity, we will not always refer to both terms, and the term “countries” is meant to encompass both, actual countries and coalitions, whenever coalitions are not stated separately.

for the EU. This variable is then normalized in terms of how often the EU itself said something in the negotiations (by dividing by the total number of EU interventions). In this way, we avoid the bias that would be caused by the countries' different levels of participation in the multilateral negotiations. Otherwise, much higher levels of supportiveness for the EU's positions would be observed than for a country like Croatia (even if both have similar positions), just because Croatia only participated actively four times in the open negotiations (against 540 interventions by the EU), so that other countries almost never had the opportunity to express support for Croatia's interventions.

We did not just generate a dependent variable that measures support towards the EU, but did it also for eight other distinct countries and coalitions that are among the most active in the negotiation process, and that represent a wide variety of interests and positions. This makes our coding more reliable than for countries that do not intervene much in plenary. These nine countries and coalitions are: the EU, the US and Russia, who are among the major actors in Annex I; Tuvalu, AOSIS and the African Group, who represent ambitious developing countries with low per capita emissions but high vulnerability to climate change; China and India, who are among the most active emerging economies in the UNFCCC; and Saudi Arabia, who as an oil-exporting economy represents special interests within the non-Annex I group. Russia, the US and, above all, Saudi Arabia are known as laggards, while the EU tries to portray itself as a climate frontrunner. Table A1 in Appendix A lists the 25 countries and coalitions that were most active in the climate negotiations in the period of analysis, highlighting the ones that were chosen for the empirical analysis.

We treat the information obtained as nine different dependent variables. We will thus perform separate regressions on how frequently each of these nine countries/coalitions has been supported by all the other countries participating in the negotiation meetings.

One of the limitations of the dataset is that it only covers the negotiation meetings that are open to external observers. Our analysis works only under the assumption that the behavior of parties in the open negotiations represents their behavior in all meetings. We believe that this assumption is plausible. The real decisions are arguably taken in closed or informal negotiation meetings, for which no information on what individual parties have said is available. However, the open meetings are generally used to either introduce the topics that will be discussed during the following week of negotiations, or summarize and debate the progress made during the past negotiation days. Thus, positions expressed in the closed negotiation meetings are not expected to deviate substantially from the ones observed in open meetings.

The conference days covered by our coding add up to around 90 days of negotiation from Bali 2007 to Copenhagen 2009. As explained in the EU example above, we aggregate the information on statements on all these conference days into a single observation per country. To do so, we sum up all statements by country  $i$  in support of country  $j$ 's position. To make the variables more easily comparable across the nine countries supported, we then consider this sum as a percentage of total interventions of country  $j$ .

Formally, if we define  $z_{ij}$  as the dummy variable for a statement made by country  $i$  in support of country  $j$ 's position, and  $n_j$  as the total number of statements by country  $j$  during the negotiation rounds between December 2007 and December 2009, we can express our dependent variables, i.e. the percentage of supportive statements, as:

$$y_{ij} = \frac{\sum_i z_{ij}}{n_j} \cdot 100, \quad i=1, \dots, 200 \quad j=1, \dots, 9 \quad (1)$$

Table 1 provides some descriptive statistics for these dependent variables. It shows that the average share of statements supporting the selected countries ranges from 0.36% of all US statements to 0.81% of all Chinese statements. These small numbers are driven by the fact that the most common behavior for most countries is not to react at all on some other countries' statements. However, as can be seen in the last column, some individual countries have lent considerable support to some others. Most prominently, some countries have explicitly expressed support for 20% of the statements made by India or China respectively.

As we are interested in the effect of Annex I (or non-Annex I) membership on these supportive statements, our central independent variable is a dummy variable that takes the value of 1 if a country is listed in Annex I of the Convention.

**Table 1: Statements declaring support for selected countries' positions (as % of their number of interventions)**

Percentage of statements supporting:	Obs	Mean	Std. Dev.	Min	Max
USA	200	0.36	1.49	0	10.50
Tuvalu	200	0.38	1.02	0	7.14
EU	200	0.39	1.26	0	8.89
AOSIS	200	0.46	1.35	0	10.39
Russia	200	0.48	1.82	0	12.86
African Group	200	0.52	1.66	0	12.12
Saudi Arabia	200	0.54	1.60	0	15.42
India	200	0.60	1.92	0	20.00
China	200	0.82	2.46	0	20.68

Note: Countries / coalitions sorted by mean support.

As discussed above, the effect of this variable can be easily confounded with the effect of a number of country characteristics that simultaneously influence country preferences and Annex I or non-Annex I membership. The most prominent variables to be considered in this context are those that capture the intentions behind the construction of Annex I, namely a differentiated treatment depending on income and emissions: both UNFCCC and the Kyoto Protocol rely on the principle of "common but differentiated responsibilities and respective capabilities", which, broadly interpreted, entails that countries should act to prevent climate change according to their contribution for causing the problem (emissions) and to their capability to act (income) (Gupta 2010). Income is expressed in terms of GNI per capita, as this measure better incorporates the notion of equity and fairness entailed in the Convention's principles than gross income. For emissions we try two specifications, total CO<sub>2</sub> emissions and CO<sub>2</sub> emissions per capita, as there are different theoretical arguments regarding which of these two measures should be used (see e.g. Ott et al. 2004; Karousakis et al. 2008; and Bakker et al. 2009).

In addition, we consider a large number of variables that capture other potentially relevant country characteristics. Country size (in terms of population) and education (measured as net

secondary enrollment) are used to capture the role of country power resources and bargaining skills of its delegation in influencing the negotiations (Snyder and Diesing 1977; Keohane and Nye 1989; Mastenbroek 1991; Steinberg 2002). Three other variables are included to more specifically model the delegation's negotiation skills: dummy variables indicating whether the country's national or official language is English or French, as language is frequently considered a barrier for communication and understanding during the technically complex climate negotiations; the number of memberships to international agreements, as an indicator of the country's experience and activity in other international negotiation settings; and the number of oral interventions during the UNFCCC negotiations between December 2007 and December 2009, as a direct measure of activity within the climate regime.

Measures of political freedom and government ideology (left-right) are used to control for the possible effect of ideological influences on country positions and behavior in the negotiations (for example, left-wing Latin American administrations such as Bolivia and Venezuela tend to use the UNFCCC as a forum to disassociate themselves from what they consider as neoliberal imperialism, see Vihma 2010, pp. 7-8).

Two indicators of vulnerability to climate change (the composite Environmental Vulnerability Index<sup>6</sup> and the relevance of income from agriculture as % of GDP), as well as characteristics related to potential benefits from specific areas under discussion (such as the use of flexible market mechanisms, the accounting of forests as sinks, the use of renewable energy, or the amount of coal and oil exported by a country) are also included to control for issue-specific interests of parties.

Finally, we consider the role of bilateral political and/or economic relationships in other areas such as aid, trade, colonial past or voting in the UN General Assembly, as these variables might influence the relationships of parties in the climate regime and thus their behavior in terms of agreeing with other parties' positions.

If not otherwise indicated, all of these variables are measured for the year 2007, the start of the coding period for our dependent variables. For a more detailed description of all variables, their descriptive statistics and data sources, see Table A2 in Appendix A.

Since country coalitions are included as single observations just as individual countries, we generate values for the respective variables by using the averages of their member countries. Only in the case of population, which is included to represent a country's power, we use the sum rather than the average to reflect the overall size of the coalition.

The available information is generally rather complete. For a few variables, we replace some missing values by linear imputation using related indicators (such as gross secondary enrolment to impute for net secondary enrolment).

Table 2 compares the country characteristics of Annex I and non-Annex I countries on the basis of selected variables considered as potentially relevant controls. A full set of variables with detailed descriptions and sources is provided in Appendix A of this paper.

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<sup>6</sup> The Environmental Vulnerability Index (EVI), developed by the South Pacific Applied Geoscience Commission and the United Nations Environment Programme, combines 50 indicators to estimate countries' vulnerability of the environment to future shocks. It does not include indicators for the social or economic vulnerability.

**Table 2: Comparing country characteristics for Annex I and non-Annex I countries**

Variable	Annex I				Non-Annex I			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
<i>Country size, political and econ. development</i>								
Population (millions)	56.73	131.39	0.03	680.10	96.67	576.95	0.002	6861.37
GDP (current US\$ trillions)	1.04	2.29	0.004	14.00	0.09	0.33	0	3.4
GNI per capita (int. \$ thousands, PPP)	30.34	17.25	6.83	107.55	7.91	11.40	0.28	78.85
Freedom House index (1=free,..., 7=unfree)	1.43	1.12	1	6.50	3.73	1.80	1	7.00
Net secondary enrolment (%)	88.67	6.90	69.50	103.11	58.07	23.00	2.6	104.54
<i>Emissions</i>								
CO <sub>2</sub> emissions (giga tonnes)	0.38	0.94	0.002	5.8	0.10	0.55	0.000004	6.5
CO <sub>2</sub> emissions (t/capita)	9.14	4.33	3.42	23.52	3.98	8.22	0.02	76.80
<i>Vulnerability</i>								
Value added from agriculture/GDP (%)	3.94	3.16	0	13.41	17.79	14.70	0	76.90
Climate change vulnerability, EVI index	3.81	0.62	2.69	5.50	3.33	0.77	1.67	5.13
(EVI index/GDP per capita)*10 <sup>3</sup>	0.16	0.10	0.04	0.57	1.60	2.89	0.04	29.72
<i>Factors of interest for specific areas under discussion</i>								
Use of flexible mechanisms	0.14	0.62	0	4.04	0.05	0.32	0	4.03
Proportion of land area covered by forests	0.32	0.17	0	0.74	0.29	0.24	0	0.95
Renewable energy production in % of energy consumption	0.75	1.44	0	7.70	0.02	0.12	0	1.18
<i>Negotiation experience and activity</i>								
Participation in int. agreements (no of memberships)	79.31	21.91	20	125.00	56.93	17.14	16	95.00
No of interventions in UNFCCC, Dec. 2007-Dec. 2009	53.35	113.60	0	540	23.17	54.26	0	382

As demonstrated by the comparison in Table 2, on average, Annex I and non-Annex I countries do indeed differ on many characteristics that may be relevant for their preferences and thus, for their statements in the negotiations. As expected, on average, Annex I countries are considerably more advanced economically and in terms of human capital (secondary enrollment). They also tend to have a more democratic regime as indicated by a considerably lower Freedom House index. Emission levels are higher both in absolute terms and per capita, and vulnerability to climate change is less prevalent, at least when considered relative to income or in terms of the relevance of the agricultural sector. Annex I countries also make

more frequent use of flexible mechanisms and of renewable energy. They tend to be members of a higher number of international agreements and also participate more actively in the debates within the UNFCCC conferences.

Despite all these differences between the mean values of the variables for Annex I and non-Annex I countries, the range of values for these variables (minimum and maximum values in the last two columns for each of the two groups) indicates that there is a wide overlap. Within Annex I, GNI per capita for instance, ranges from 6830\$ (PPP) for Ukraine to 109170\$ for Liechtenstein. Within non-Annex I, it ranges from 280\$ for Liberia to 80090\$ for Qatar. While the poorest non-Annex I countries and the richest Annex I countries do not find an appropriate match, a number of countries have incomes that are comparable between the two groups. The same is true for all other variables in Table 2. Given the large variety of countries in non-Annex I the range of country characteristics is frequently wider there than for Annex I. For different variables, this implies that both the smallest and the largest values are to be found in non-Annex I countries. As non-Annex I also includes all oil-exporting Arab countries, this is notably the case for per capita CO<sub>2</sub> emissions.

All in all, the comparison of country characteristics in Table 2 highlights the importance of an appropriate control for these factors in our empirical estimation strategy. Moreover, it indicates that the overlap between both groups should be strong enough to allow us to refine the estimation strategy by using a set of truly comparable countries, in order to test the robustness of our results.

## 5. The impact of Annex I membership: Estimation methods and results

In order to test the effect of Annex I membership we first run multivariate regressions controlling for a large number of context variables. We use a tobit model to take into account that the percentage of joint statements is censored at zero (a share smaller than zero cannot be observed)<sup>7</sup>. In a second step, we use propensity score matching to test the robustness of our results.

In principle, the advantage of regression analysis is that we get an impression of the effect of our control variables, along with our explanatory variable, so that we can get an idea of the plausibility of the model as a whole. Unfortunately, it turns out that correlations between the different right hand side variables are very high (see Appendix A, Table A3) so that we can make sense of the coefficients only when we avoid entering too many variables at once. Since all of the variables in Appendix A, Table A2 appear theoretically relevant as controls we revert to a mechanical forward selection procedure including all variables with p-values ≤ 0.2. Only our central dummy variable for Annex I membership is included per default, independently of this threshold.

Table 3 presents the results for these parsimonious regressions. Numbers represent the marginal effects estimated at the means of the sample, i.e.:

$$\frac{\partial E(y_{ij})}{\partial x_i}, \quad \text{with } y_{ij}=0 \text{ if } x_i'b + u_i \leq 0, \text{ and } y_{ij}=x_i'b+u_i \text{ otherwise.}$$

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<sup>7</sup> While theoretically the dependent variable is also censored at 100 (a percentage higher than 100 cannot be observed), all our observations are well below this threshold, so that we do not need to account for this upper censoring.

Where  $x_i$  denotes the vector of right hand side variables for country  $i$  in regression  $j$  (considering the statements by country  $i$  in support of the positions of country  $j$ ), and  $u_i$  is the corresponding error term.<sup>8</sup>

**Table 3: Determinants of supportive statements (in %)**

Support for:	EU	USA	Russia	AOSIS	African Group	Tuvalu	China	India	Saudi Arabia
Annex I	0.160	0.185	0.757	-0.245***	-0.337***	-0.238***	-0.280***	-0.412***	-0.084
No of interventions	0.005***	0.000	0.001	0.005***	0.005***	0.004***	0.006***	0.006***	0.004***
Population	0.000***	0.000	0.000	0.000**	0.000	0.000**	0.000**	0.000**	0.000
GNI per capita			-0.001				0.005*		0.008***
Education	0.003**		0.001	-0.004**					
English language	0.213***	0.017					0.092		
French language							-0.131**	-0.233***	-0.145***
Intl. agreements				0.004*			0.006***	0.009***	0.004**
CO <sub>2</sub> emissions				0.174***	0.236***	0.051	0.484***	0.396***	0.197**
Freedom House		-0.005		-0.049**		-0.061***			
Right government									
Left government		0.007					0.081		0.132*
Agriculture		0.001							
Vulnerability	-0.120***	-0.013	-0.024						
UNGA voting	0.395						-1.028*		-1.871***
Colony		0.001	-0.025						
Fossil exports				-0.635		-0.595			
Forests		-0.027	-0.136		0.298				-0.275*
Renewables		-0.024	-0.090				-0.664***	-0.426**	-0.529***
Flexible mechanisms		0.009		0.110				0.158	
Trade with USA		0.051							
Aid from USA		-1.890							
Trade Saudi Arabia									-0.894*
Observations	178	177	178	178	178	178	178	178	168
Left censored	125	145	158	130	136	138	119	124	116
Log likelihood	-108	-62	-67	-116	-138	-105	-142	-146	-121
Pseudo R <sup>2</sup>	0.39	0.54	0.38	0.38	0.23	0.33	0.41	0.32	0.39

Notes: Tobit regressions, values are for marginal effects, with  $y_{ij}=0$  if  $x_i'b + u_i \leq 0$ , and  $y_{ij} = x_i'b + u_i$  otherwise. Significance at the 1%, 5% and 10% level is denoted by \*\*\*, \*\* and \* respectively. Constant not reported. For variable descriptions, see Appendix A, Table A2.

Table 3 shows that even after controlling for a number of relevant control variables, membership to Annex I remains significant in five out of nine regressions. The direction of the effect of membership to Annex I is in all cases as expected: coefficients are positive for the EU, USA and Russia, and negative (and statistically significant) for AOSIS, the African Group, Tuvalu, China and India. The effect is negative but not significant in the case of Saudi

<sup>8</sup> In Appendix B, Tables B2-B3 we also report marginal effects for strictly positive values of  $y_{ij}$ . Such marginal effects show the effect of our explanatory variables on the percentage of statements supporting country  $j$  by those countries  $i$  that at least expressed such support once. In these models the observed relationships are even stronger than in Table 3 above, both substantively and in terms of statistical significance.

Arabia. This makes sense, since it implies that, after controlling for country characteristics that may make their preferences and positions similar, Annex I members more frequently support other Annex I members (EU, USA and Russia), but less frequently support those countries or coalitions that are not part of Annex I (all the others). The size of the coefficients is substantial in several cases. For example, the expected percentage of statements supporting Russia is 0.76 percentage points larger for Annex I countries than for non-Annex I countries. This corresponds to about 42% of a standard deviation. In the case of AOSIS, the African Group, Tuvalu and India, the percentage of supportive statements is about 20% of a standard deviation smaller for Annex I countries than for non-Annex I ones. In other regressions coefficients are smaller, but still non-negligible. In the case of Saudi Arabia, both the size of the coefficient and the statistical significance indicate that there is no important effect of being (or not being) in Annex I on the percentage of supportive statements. This is in line with the observation that Saudi Arabia frequently blocks progress in the negotiations, and thus neither Annex I nor most non-Annex I countries usually support its views. Saudi Arabia fears that climate change mitigation efforts may affect its oil-based economy, and also represents the view that measures to compensate countries for the negative effects of climate change policies should be considered as measures to adapt to climate change, position that is not shared by most other developing countries.

The signs of our central control variables correspond to what we should expect: Countries who generally intervene more frequently in the negotiation process also do so more frequently in support of other countries' arguments, so that the coefficient for the number of interventions is positive in all regressions. Similarly, English speaking, larger countries and countries with a higher level of education and with more participation in international organizations (with better negotiation skills and more political power, and probably also represented by a higher number of negotiators) also tend to make more supportive statements (in the case of AOSIS, the negative sign of the education variable may be related to a high support by other poor and vulnerable countries, such as Least Developed Countries, which also display low levels of education).<sup>9</sup> The fact that countries with more CO<sub>2</sub> emissions – thus those that are more responsible for causing climate change – appear to show more support for the non-Annex I countries among our sample (AOSIS, Africa, Tuvalu, China, India), may be related to the fact that the largest emitter – China – belongs to non-Annex I, and thus frequently supports the positions of peers in this group.

In addition, we observe that more democratic countries (i.e. countries with a lower value on the Freedom House index) tend to support AOSIS and Tuvalu more. This may be related with public opinion in these countries expressing concern about the effects of climate change on small island states. More vulnerable countries lend less support to the EU, USA and Russia, probably due to their – in the view of vulnerable countries – insufficient commitment towards deeper cuts in emissions. Exporters of coal and oil lend less support to the vulnerable small island states, and countries with a high share of renewable energy (solar, tide, wave and wind) in national energy consumption tend to lend less support to China, India and Saudi Arabia, which is not surprising, since these are mainly European and other Annex I countries. It is also interesting that the variable measuring agreement with the US in the UN General Assembly, which is highly correlated with our Annex I dummy (see Table A3 in the Appendix), has a large negative effect on support for China and Saudi Arabia, but that at least

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<sup>9</sup> While the overall number of interventions is already controlled for, these variables may convey additional information on the potential to be active in the negotiations. They may, for instance, capture some non-linearities related to the overall number of interventions.

for China, the effect of Annex I is still noticeable and significant. We do not find a clear pattern for the other control variables.

Thus, overall, the results of the regressions appear reasonable and increase our confidence in the model as a whole and in the appropriateness of the selected controls. A table with results for a more complete set of right hand side variables is provided for comparison in Appendix B (Table B1). Comparing the log likelihood and the pseudo  $R^2$  shows that the inclusion of further variables does not substantially improve the overall regression fit, which is confirmed through Wald and likelihood ratio tests. Due to the strong multicollinearity, many variables become insignificant individually (for a correlation matrix, see Appendix A, Table A3). However, our most relevant variable indicating the effect of Annex I membership is still significant (with the expected sign) in five of the regressions.

Other robustness checks included using total GDP instead of total population, CO<sub>2</sub> emissions per capita instead of total emissions, and generating the population value for the country coalitions using the mean (as for other variables) rather than the sum. The results for our main explanatory variable, Annex I, remain robust to these different specifications, and are available on request.

The tobit regressions thus clearly indicate a role of Annex I versus non-Annex I membership that holds over and above the influence of relevant country characteristics. However, a problem with our regression analysis may be undue extrapolation that leads us to compare countries that are not really fully comparable. As discussed above and illustrated in Table 2 a number of countries within Annex I and non-Annex I do not find appropriate matches in the other group and regression results may be problematic if they are driven by these observations. In addition, especially in Table 3, the preoccupation with multicollinearity may have led us to omit relevant control variables thereby trading off the unbiased coefficients of the Annex I dummy against the overall interpretability of regression results. And finally, besides the assumptions of normality of residuals and homoscedasticity, which are critical for the tobit to be consistent, we also assumed a linear relationship between the percentage of supportive statements and the right hand side variables while our theoretical framework provides no indication that the relationship should really be linear.

To take these issues into account, we now proceed with a nonparametric matching analysis. Following the terminology of the treatment evaluation literature, Annex I membership is considered as a “treatment” to which the country (or country coalition) is subjected. The empirical strategy attempts to select other countries as controls that correspond in their characteristics to those countries that received the treatment. If all variables simultaneously influencing the treatment decision (i.e. the decision about which country is part of Annex I) and the share of joint statements are taken into account, the “selection on observables” (Heckman and Robb 1985) or “conditional independence” (Lechner 1999) assumption (CIA) is satisfied and the impact of Annex I membership can be identified.

Let  $Y_{ij}^0$  denote the percentage of statements supporting country  $j$ , made by any given country  $i$  if it were not in Annex I, and let  $Y_{ij}^1$  denote the percentage of supportive statements if the same country  $i$  were in Annex I. The difference  $Y_{ij}^1 - Y_{ij}^0$  in these potential outcomes represents the impact of Annex I membership. Let  $X$  denote all the confounding variables which simultaneously influence these potential outcomes and the probability that country  $i$  is member of Annex I, including income, emissions and all other relevant characteristics mentioned above. As our data set is very rich and includes all variables we could think of as potentially important for either selection into Annex I or the share of joint statements, we are

confident that the CIA is satisfied. By conditioning on  $X$ , the potential outcomes are then identified as:

$$E[Y_j^1 | X] = E(Y_j | D=1, X) \quad \text{and} \quad E[Y_j^0 | X] = E(Y_j | D=0, X),$$

where  $D$  denotes the observed status of Annex I membership of country  $i$  ( $D=1$  for Annex I countries,  $D=0$  for non-Annex I countries). With this relationship and by averaging with respect to the population distribution of  $X$ , the average treatment effect on the treated (ATT) is identified as:

$$ATT = \int [E(Y_j^1 | X) - E(Y_j^0 | X)] \cdot dF_{X|D=1} = \int [E(Y_j | D = 1, X) - E(Y_j | D = 0, X)] \cdot dF_{X|D=1} \cdot (2)$$

This effect can be distinguished from the treatment effect on the untreated (ATU), i.e. the effect of Annex I membership on countries that are not members so far:

$$ATU = \int [E(Y_j^1 | X) - E(Y_j^0 | X)] \cdot dF_{X|D=0} = \int [E(Y_j | D = 1, X) - E(Y_j | D = 0, X)] \cdot dF_{X|D=0} \cdot (3)$$

Since Annex I and non-Annex I countries differ in a number of characteristics, the effect of having been selected as an Annex I country (ATT) and the effect of being selected among current non-Annex I countries may be different so that it may be interesting to look at both.

As demonstrated by Rosenbaum and Rubin (1983), the estimation of the treatment effect can be facilitated if the information incorporated in the relevant control variables is first projected into a single variable, the propensity score  $p(x)=P(D=1|X=x)$ . They showed that if matching on  $X$  is consistent, matching with respect to the propensity score  $p(x)$  is consistent as well. The multidimensional problem of matching on  $X$  is thereby reduced to the one-dimensional problem of matching on  $p(X)$ . The propensity score is usually estimated by a probit regression, i.e., in our case by a probit regression of the binary treatment variable ‘‘Annex I membership’’ on  $X$ .

The control variables  $X$  are selected on the basis of the common relevance for selection into Annex I and for supportive statements. The discussion of the tobit model already gave us some initial idea about variables relevant in the latter context. But to satisfy the CIA, we also need to look at the correlates of Annex I membership. Just as in the case of our tobit regressions, we do so by first identifying a large number of theoretically plausible variables which we then reduce to a smaller number running a mechanical statistical selection procedure. To be sure not to omit any relevant variable, we set the cut-off at a p-value of 30%, and carry out both, forward and backward selection eventually using all variables that have been included in either of the two. In addition, we include variables that appear particularly pertinent from the joint statements regression and GNI per capita, which is usually insignificant after controlling for the other variables in our regressions, but yet an important theoretical determinant of Annex I membership. Results of the final probit estimation are presented in Appendix B, Table B4.

For the estimation of the conditional expectation function we use nearest neighbor matching with the five nearest neighbors, i.e., we compare each observation for an Annex I country, with the five non-Annex I observations that have the most similar propensity score, and vice versa. We opt for nearest neighbor matching rather than kernel matching or radius matching simply because this option generated the most convincing matches whereby treated and untreated countries no longer significantly differ in any of the relevant characteristics. Table 4 presents the comparison of means among Annex I and non-Annex I members as in Table 2 and compares them to the means after the matching procedure<sup>10</sup>.

**Table 4: Comparison of means before and after matching**

Variable	Sample	Mean		%bias	% reduct  bias	t-test	
		Treated	Control			t	p> t
GNI per capita	Unmatched	26.91	7.54	159.00		8.70	0.00
	Matched	19.50	22.02	-20.70	87.00	-0.69	0.50
Education	Unmatched	87.70	57.46	176.70		7.42	0.00
	Matched	85.51	87.78	-13.20	92.50	-0.69	0.50
Vulnerability	Unmatched	3.71	3.29	62.10		2.97	0.00
	Matched	3.61	3.86	-36.60	41.00	-1.16	0.25
CO <sub>2</sub> emissions per capita	Unmatched	8.71	3.87	73.20		3.23	0.00
	Matched	8.05	7.45	9.10	87.60	0.41	0.68
Renewables	Unmatched	0.78	0.03	67.70		5.76	0.00
	Matched	0.15	0.21	-4.80	93.00	-0.45	0.65
Left government	Unmatched	0.28	0.28	-0.40		-0.02	0.98
	Matched	0.28	0.34	-12.50	-2767.30	-0.37	0.71
Right government	Unmatched	0.32	0.12	49.10		2.89	0.00
	Matched	0.29	0.31	-4.70	90.50	-0.12	0.90
Freedom House Index	Unmatched	1.52	3.87	-152.30		-7.18	0.00
	Matched	1.88	2.24	-23.50	84.60	-0.73	0.47
UNGA voting	Unmatched	0.30	0.11	242.00		11.32	0.00
	Matched	0.29	0.25	52.90	78.10	0.89	0.38
Intl. agreements	Unmatched	79.19	58.03	124.00		6.61	0.00
	Matched	66.69	62.98	21.80	82.50	0.91	0.37
English language	Unmatched	0.15	0.38	-53.00		-2.53	0.01
	Matched	0.21	0.29	-19.60	63.00	-0.58	0.56

For variable descriptions, see Appendix A, Table A2.

This highly convincing matching result does, however, come at a cost. In fact, to compare only those countries that are comparable at all, we impose common support, i.e., we delete all observations from the dataset that are outside the range of characteristics for the comparison group. Table 5 shows that the actual number of countries that are eventually used in our analysis, thereby shrinks considerably to about 60. Moreover, we had to exclude the variable reflecting the total number of interventions. As soon as this variable is included in the analysis, the matching procedure is unable to find convincing matches. This may be problematic as the number of interventions is clearly important as a determinant of supportive

<sup>10</sup> Values between Table 2 and Table 4 may differ due to missing values in some of the variables used in the matching procedure.

statements. At the same time, it was generally not significant in the probit regressions we estimated to find the most appropriate equation for the propensity score, at soon as the other variables were controlled for. We therefore believe that the CIA is satisfied even without inclusion of the number of interventions as a control.

The results of our nonparametric matching estimator, for both ATT and ATU are also presented in Table 5. The matching analysis was carried out using the corresponding Stata module prepared by Leuven and Sianesi (2003).

**Table 5: Estimation results of propensity score matching**

% of supportive votes for:	ATT	ATU	off support		on support	
			untreated	treated	untreated	treated
EU	0.86	0.09	103	14	42	19
USA	0.78	0.26	103	15	42	19
Russia	1.73 *	2.52 *	107	16	38	17
AOSIS	-0.13	-0.24	102	15	42	19
African Group	-0.15	-0.38	102	15	42	19
Tuvalu	-0.28	-0.48	102	15	42	19
China	-0.54	-1.20 **	101	15	43	19
India	-0.80	-1.09 ***	102	15	42	19
Saudi Arabia	-0.38	-0.69 *	103	15	41	19

Notes: Significance at the 1%, 5% and 10% level is denoted by \*\*\*, \*\* and \* respectively.

Constant not reported. For variable descriptions, see Appendix A, Table A2.

Our results show that, at least for statements in support of some countries (Russia, China, India and Saudi Arabia) either ATT or ATU are significant. In several other cases, the estimates are very close to significant at the 10% level (e.g., ATU for Africa, with a t-value of 1.61, and for Tuvalu, with a t-value of 1.56). Even for a considerably restricted set of comparable countries, and when comparing each country only to those countries that are the most similar in all relevant country characteristics, it appears that the effect of Annex I membership cannot be neglected. All significant treatment effects are sizeable and show the expected sign. With 1.7 percentage points, ATT corresponds to about 0.9 standard deviations of the support for Russia, with 2.5, ATU corresponds to 1.4 standard deviations of support for Russia. In the cases of China, India and Saudi Arabia, the significant ATU correspond to 0.5, 0.6 and 0.4 the standard deviation, respectively. Thus, while the matching exercise – notably through the reduction in the number of observations – led to lower levels of significance, the estimated impacts are even higher than in the tobit regressions presented above. Even if, in our matching analysis, the impact is not discernible for joint statements with all nine different countries considered here, it is well discernible for some.

This implies that the split between Annex I and non-Annex I membership has indeed been responsible for some of the negotiation dynamics observed during the UNFCCC negotiations. For given country characteristics, Annex I membership played a role for positions supported in the negotiation process. Since, at given country characteristics, Annex I countries tend to support other Annex I countries, while non-Annex I countries tend to support them less, the mere existence of the split between Annex I and non-Annex I seems to have amplified the existing divide between developing and industrialized countries.

More generally, this implies that the creation of new country groups within an international negotiation process has institutional consequences that require some in-depth reflection. Short-term agreements found via differential treatment of specific country groups may come at a cost during later negotiation rounds. While our evidence for the UNFCCC does not suggest that the consequences of the Annex I / non-Annex I divide have been disastrous for the negotiation outcomes, it still suggests that they exist.

Three theoretical arguments have been advanced in Section 3 to support our constructed peer-group hypothesis that describes this phenomenon: group psychology (closer relationships through exchange within groups), negotiation structure (initial group discussions leading to more distanced positions debated at the global level), and new incentives (fighting for the preservation of new group-related privileges). In this paper, we cannot distinguish between these three effects.

However, the distinction appears to be relevant for appropriate policy recommendations. If the new incentives argument is relevant, negotiators may be able to mitigate or even avoid the negotiation dynamics described above, by agreeing on automatic ‘graduation rules’ from one group to the other, or, in any case, on fixed membership criteria rather than fixed country lists. As Rajamani (2006) discusses, differential treatment needs to work within a controlled framework, in which it does not obstruct the general purpose of the treaty, it responds to real differences across pre-determined country categories, and it ceases to exist when these differences cease to exist. If the group psychology or the negotiation structure arguments are more relevant, it may be more promising to channel the formal and informal debates in an open, transparent and inclusive way, and to build bridges through cross-cutting working groups like the Environmental Integrity Group. It may be worthwhile to follow these questions in further research. To reach more general conclusions, such research could also compare the case of the UNFCCC elaborated here, to more detailed case studies of other international organizations such as the WTO.

## **6. Conclusions**

International organizations sometimes institutionalize country groupings by specifying differentiated rules and commitments that may, in turn, generate new negotiation dynamics. We propose a theoretical explanation for such dynamics through our “constructed peer-group” hypothesis and advance three theoretical arguments in its support. These are: (i) group psychology, (ii) changes in the structure of the negotiation process, and (iii) new incentives. The constructed peer-group hypothesis is analyzed at the example of the UNFCCC’s split between Annex I and non-Annex I countries.

Using a self-coded dataset of country statements during the climate change negotiation rounds between December 2007 and December 2009 we assess whether Annex I membership influences a country’s stance towards other countries’ arguments. The challenge of the econometric estimation is to disentangle the effect of group construction from the effect of various background characteristics that may drive countries’ preferences and, simultaneously, the affiliation to Annex I. As a response, we do not only carry out multivariate tobit regression analysis, but also apply propensity score matching, i.e., a quasi-experimental method allowing us to avoid functional form assumptions and to restrict the sample to effectively comparable observations.

We find that, over and above the ex ante differences in country characteristics and preferences, the split between Annex I and non-Annex I countries has indeed influenced

negotiation behavior and thereby amplified the existing divide between developing and industrialized countries. This supports our constructed peer-group hypothesis, and thereby the idea of path dependence for negotiation structures and dynamics. If new incentives due to the privileges for non-Annex I countries are the driving force of this result, it may be important to attach privileges to the relevant country characteristics, rather than to a list of country names in the future. If group psychology and / or negotiation structure are more relevant, appropriate chairing of the negotiation rounds with transparent and inclusive channels for formal and informal debates and ample opportunities for deliberations in settings including both Annex I and non-Annex I members (e.g., through cross-cutting working groups) could mitigate the divide between these groups. Whatever is more important here is a question we have to leave for future research.

### **List of abbreviations**

ALBA	Bolivarian Alliance of Latin American Countries
AOSIS	Alliance of Small Island States
ATT	Average treatment effect on the treated
ATU	Average treatment effect on the untreated
BASIC	Group of Brazil, China, India and South Africa
CACAM	Central Asia and the Caucasus, Albania and Moldova
CDM	Clean Development Mechanism
CIA	Conditional independence assumption
COP	Conference of the Parties to the UNFCCC
EIG	Environmental Integrity Group
ENB	Earth Negotiations Bulletin
EU	European Union
EVI	Environmental Vulnerability Index
GHGs	Greenhouse gases
IISD	International Institute for Sustainable Development
LDCs	Least Developed Countries
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
SICA	Central American Integration System
SIDSs	Small Island Developing States
SOPAC	South Pacific Applied Geoscience Commission
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
US	United States
WTO	World Trade Organization

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## Appendix A: Variables and Sources

**Table A1: Countries most active in the negotiations**

<b>Country</b>	<b>Number of interventions</b>	<b>Group</b>
<b>European Union</b>	540	Annex I
G-77	382	Non-Annex I
Japan	320	Annex I
Australia	285	Annex I
<b>China</b>	266	Non-Annex I
<b>United States of America</b>	238	Annex I
<b>AOSIS</b>	231	Non-Annex I
<b>Saudi Arabia</b>	227	Non-Annex I
Brazil	225	Non-Annex I
Canada	216	Annex I
<b>India</b>	205	Non-Annex I
New Zealand	198	Annex I
Norway	160	Annex I
<b>African Group</b>	132	Non-Annex I
South Africa	130	Non-Annex I
<b>Tuvalu</b>	126	Non-Annex I
Switzerland	109	Annex I
LDCs	109	Non-Annex I
Colombia	89	Non-Annex I
Bolivia	79	Non-Annex I
Argentina	78	Non-Annex I
Bangladesh	72	Non-Annex I
Mexico	72	Non-Annex I
<b>Russian Federation</b>	70	Annex I
Venezuela	62	Non-Annex I

Note: Countries in bold letters are those that have been chosen for the empirical estimation as dependent variables.

**Table A2: Variable descriptions**

Variable	Description	Obs	Mean	Std. Dev.	Min	Max	Sources (year of data, if different from 2007)
Support EU	Statements supporting EU in % of all EU statements	200	0.39	1.26	0.00	8.89	IISD 2007-2009 (2007-2009)
Support USA	Statements supporting US in % of all US statements	200	0.36	1.49	0.00	10.50	IISD 2007-2009 (2007-2009)
Support Russia	Statements supporting Russia in % of all Russian statements	200	0.48	1.82	0.00	12.86	IISD 2007-2009 (2007-2009)
Support AOSIS	Statements supporting AOSIS in % of all AOSIS statements	200	0.46	1.35	0.00	10.39	IISD 2007-2009 (2007-2009)
Support Africa	Statements supporting African Group in % of all African Group statements	200	0.52	1.66	0.00	12.12	IISD 2007-2009 (2007-2009)
Support Tuvalu	Statements supporting Tuvalu in % of all Tuvalu statements	200	0.38	1.03	0.00	7.14	IISD 2007-2009 (2007-2009)
Support China	Statements supporting China in % of all Chinese statements	200	0.82	2.46	0.00	20.68	IISD 2007-2009 (2007-2009)
Support India	Statements supporting India in % of all Indian statements	200	0.60	1.92	0.00	20.00	IISD 2007-2009 (2007-2009)
Support Saudi Arabia	Statements supporting Saudi Arabia in % of all Saudi statements	200	0.54	1.60	0.00	15.42	IISD 2007-2009 (2007-2009)
Annex I	Annex I membership	200	0.21	0.41	0.00	1.00	UNFCCC 2010a (2010)
Population	Population (in million)	201	79.72	399.66	0.00	5100.00	World Bank 2009
GDP	GDP [current US\$ trillion]	199	0.56	2.37	0.00	22.00	World Bank 2009
GNI per capita	GNI per capita, PPP [in thousands of international \$] (imputed using GDP and population)	198	12.77	15.77	0.28	107.39	World Bank 2009
English language	English is national or official language	201	0.35	0.48	0.00	1.00	Lewis 2009 (2009)
French language	French is national or official language	201	0.20	0.40	0.00	1.00	Lewis 2009 (2009)
Education	Net secondary enrolment rates, in % (imputed using GDP and gross secondary enrolment)	199	64.66	24.13	2.60	104.79	World Bank 2009
Agriculture	Value added from agri-culture/GDP	200	14.23	14.37	0.00	76.90	World Bank 2009
Vulnerability	Climate change vulnerability, EVI index	198	3.44	0.76	1.67	5.50	SOPAC 2010
Vulnerability per GDP	[Climate change vulnerability(EVI index)/GDP per capita] *10 <sup>3</sup>	195	1.29	2.62	0.04	29.72	SOPAC 2010, World Bank 2009
CO <sub>2</sub> emissions	CO <sub>2</sub> emissions, in giga tons	195	0.32	1.48	0.00	13.00	UNSTATS 2010, UNFCCC 2010b
CO <sub>2</sub> emissions per capita	CO <sub>2</sub> emissions [t/capita]	195	2016.50	28088.65	0.02	392241.70	UNSTATS 2010, UNFCCC 2010b, World Bank 2009
Renewables	Energy production from solar, tide, wave and wind in % of energy consumption	200	0.18	0.73	0.00	7.70	US Energy Information Administration 2010
Colony	Former European colony	201	0.53	0.50	0.00	1.00	Michaelowa et al. 2009
Fossil exports	Value of coal and oil exports / GDP	199	0.02	0.08	0.00	0.66	UN Comtrade 2010

Table A2: Variable descriptions (cont.)

Variable	Description	N	Mean	Std. Dev.	Min	Max	Sources (year of data, if different from 2007)
Trade with China	Value of exports to and imports from China / GDP	199	0.30	3.25	0.00	45.85	CoW Trade 2007, World Bank 2009
Trade with Saudi Arabia	Value of exports to and imports from Saudi Arabia / GDP	186	1.37	18.48	0.00	252.03	CoW Trade 2007, World Bank 2009
Trade with Tuvalu	Value of exports to and imports from Tuvalu / GDP	201	0.00	0.00	0.00	0.01	CoW Trade 2007, World Bank 2009
Trade with USA	Value of exports to and imports from the US / GDP	188	0.09	0.11	0.00	0.66	CoW Trade 2007, World Bank 2009
Aid from EU	Net bilateral aid flows from EU countries and EU council/GDP	201	0.03	0.07	-0.01	0.49	DAC 2007, World Bank 2009
Aid from USA	Net bilateral aid flows from US/GDP	201	0.01	0.04	0.00	0.39	DAC 2007, World Bank 2009
Freedom House	Freedom House index, 1=free,....,7=unfree	199	3.24	1.93	1.00	7.00	Freedom House 2008
Right government	Right-wing government	201	0.16	0.37	0.00	1.00	DPI 2010 (2009)
Left government	Left-wing government	201	0.26	0.44	0.00	1.00	DPI 2010 (2009)
UNGA voting	Vote share with the US in UN general assembly, 2005-2008	187	0.15	0.12	0.00	0.69	Dreher 2008 (average 2005-2008)
Intl. agreements	Participation in international agreements (no of memberships)	197	61.88	20.42	16.00	125.00	CoW IGO 2005 (2005)
Flexible mechanisms	Use of flexible mechanisms=[No of CDM+JI projects with national entities as buyers or sellers/GDP (in cur. US\$)]*10 <sup>9</sup>	201	0.06	0.40	0.00	4.04	UNEP Risoe 2010 (2010)
Forests	Proportion of land area covered by forests	199	0.30	0.23	0.00	0.95	FAO 2005 (2005)
No of interventions	No of interventions in UNFCCC, Dec. 2009-Dec. 2010	201	30.62	73.11	0.00	540.00	IISD 2007-2009 (2007-2009)

**Table A3: Correlation matrix**

	Annex I	Population	GDP	GNI per capita	English language	French language	Education	Agriculture	Vulnerability	Vulnerability per GDP
Annex I	1.00									
Population	-0.04	1.00								
GDP	0.29	0.19	1.00							
GNI per capita	0.55	-0.05	0.24	1.00						
English language	-0.16	0.17	-0.06	-0.12	1.00					
French language	-0.12	0.18	-0.13	-0.12	0.06	1.00				
Education	0.50	-0.05	0.23	0.63	-0.18	-0.35	1.00			
Agriculture	-0.38	0.02	-0.23	-0.57	0.16	0.22	-0.64	1.00		
Vulnerability	0.28	0.00	0.12	0.31	0.02	-0.14	0.42	-0.31	1.00	
Vulnerability/GDP	-0.22	-0.04	-0.14	-0.32	0.06	0.08	-0.31	0.38	-0.13	1.00
CO <sub>2</sub> emissions	0.05	0.21	0.82	0.02	-0.05	-0.10	0.07	-0.09	0.07	-0.06
CO <sub>2</sub> emissions/cap	0.23	-0.03	0.14	0.79	-0.12	-0.15	0.47	-0.44	0.22	-0.22
Renewables	0.40	-0.01	0.19	0.31	-0.06	-0.09	0.23	-0.19	0.20	-0.10
Colony	-0.55	-0.13	-0.24	-0.47	0.18	0.17	-0.47	0.22	-0.27	0.18
Fossil exports	-0.13	-0.01	0.01	0.19	-0.14	-0.10	0.01	-0.14	0.02	-0.09
Trade with China	-0.04	0.00	-0.03	-0.06	-0.05	-0.04	-0.03	0.05	0.10	0.08
Trade w Saudi Arabia	-0.04	0.00	-0.03	-0.06	-0.05	-0.04	-0.03	0.04	0.11	0.07
Trade with Tuvalu	-0.05	0.05	-0.04	-0.05	0.15	0.01	0.05	-0.01	0.03	-0.02
Trade with USA	-0.22	0.01	-0.03	-0.06	0.10	0.00	-0.01	-0.08	-0.07	-0.07
Aid from EU	-0.25	0.00	-0.18	-0.34	0.16	0.19	-0.53	0.51	-0.26	0.47
Aid from USA	-0.15	0.02	-0.11	-0.21	0.15	0.01	-0.28	0.31	-0.17	0.36
Freedom House	-0.52	0.03	-0.12	-0.36	-0.08	0.13	-0.41	0.36	-0.21	0.32
Right government	0.22	-0.02	0.10	0.20	0.08	-0.16	0.24	-0.23	0.20	-0.15
Left government	-0.02	0.04	0.13	-0.11	-0.08	-0.11	0.02	-0.02	-0.07	0.07
UNGA voting	0.82	-0.05	0.24	0.51	-0.19	-0.20	0.54	-0.40	0.32	-0.26
Intl. agreements	0.45	0.03	0.42	0.33	-0.24	0.05	0.20	-0.28	-0.02	-0.15
Flexible mechanisms	0.00	0.00	0.06	0.24	0.11	-0.04	0.17	-0.10	0.16	-0.06
Forests	0.08	0.00	0.02	-0.04	0.08	0.01	0.06	0.01	-0.30	-0.03
No of interventions	0.11	0.51	0.42	0.12	0.20	0.12	0.11	-0.12	-0.01	-0.11

Table A3: Correlation matrix (cont.)

	CO <sub>2</sub> emissions	CO <sub>2</sub> emissions/cap	Renewables	Colony	Fossil exports	Trade with China	Trade with Saudi Arabia	Trade with Tuvalu	Trade with USA	Aid from EU
CO <sub>2</sub> emissions	1.00									
CO <sub>2</sub> emissions/cap	0.06	1.00								
Renewables	0.02	0.09	1.00							
Colony	-0.14	-0.35	-0.22	1.00						
Fossil exports	0.02	0.38	-0.06	-0.10	1.00					
Trade with China	-0.01	-0.02	-0.02	-0.09	-0.02	1.00				
Trade w Saudi Arabia	-0.01	-0.02	-0.02	-0.09	-0.02	1.00	1.00			
Trade with Tuvalu	-0.02	-0.04	-0.02	0.03	-0.03	-0.01	-0.01	1.00		
Trade with USA	0.00	-0.02	-0.07	0.27	0.09	-0.05	-0.06	0.00	1.00	
Aid from EU	-0.10	-0.26	-0.11	0.17	-0.08	-0.03	-0.04	-0.03	0.02	1.00
Aid from USA	-0.06	-0.15	-0.07	-0.01	0.03	-0.01	-0.02	-0.01	0.17	0.68
Freedom House	0.10	-0.05	-0.28	0.18	0.25	0.15	0.14	0.05	-0.03	0.19
Right government	-0.02	0.07	0.17	-0.05	0.02	-0.04	-0.03	-0.03	0.22	-0.17
Left government	0.13	-0.14	0.06	0.08	-0.10	0.12	0.12	-0.05	0.00	-0.03
UNGA voting	0.00	0.20	0.37	-0.57	-0.15	-0.07	-0.06	-0.02	-0.17	-0.26
Intl. agreements	0.17	0.06	0.40	0.00	-0.04	-0.16	-0.15	-0.09	0.06	-0.21
Flexible mechanisms	0.01	0.08	0.01	-0.12	-0.04	0.00	-0.01	0.02	0.18	-0.06
Forests	-0.03	-0.14	-0.02	0.10	-0.28	0.08	0.08	0.10	0.18	0.02
No of interventions	0.36	0.07	0.03	-0.17	0.06	-0.03	-0.03	0.03	-0.02	-0.11

Table A3: Correlation matrix (cont.)

	Aid from USA	Freedom House	Right government	Left government	UNGA voting	Intl. agreements	Flexible mechanisms	Forests	No of interventions
Aid from USA	1.00								
Freedom House	0.19	1.00							
Right government	-0.10	-0.36	1.00						
Left government	-0.10	-0.03	-0.28	1.00					
UNGA voting	-0.15	-0.67	0.28	0.00	1.00				
Intl. agreements	-0.18	-0.42	0.20	0.10	0.40	1.00			
Flexible mechanisms	-0.04	-0.01	-0.02	-0.04	0.02	-0.03	1.00		
Forests	-0.04	-0.18	0.01	0.14	0.08	0.06	-0.08	1.00	
No of interventions	-0.05	-0.11	0.00	0.12	0.12	0.22	0.02	0.00	1.00

## Appendix B: Additional statistical results

**Table B1: Determinants of supportive statements (in %), additional tobit regressions**

Support for:	EU	USA	Russia	AOSIS	African Group	Tuvalu	China	India	Saudi Arabia
Annex I	0.206	0.074	0.259	-0.229 ***	-0.257 **	-0.183 ***	-0.267 **	-0.363 ***	-0.075
No of interventions	0.005 ***	0.000	0.000	0.005 ***	0.004 ***	0.003 ***	0.006 ***	0.005 ***	0.004 ***
Population	0.000 ***	0.000	0.000	0.000 **	0.000	0.000 **	0.000 **	0.000 *	0.000
GNI per capita	0.004	0.000	0.000	0.003	-0.003	-0.004	0.001	-0.004	0.007 **
Education	0.003 *	0.000	0.000	-0.005 **	-0.003	0.000	0.002	0.003	0.000
English language	0.158 **	0.018	0.008	0.016	0.178	0.012	0.094	0.075	-0.007
French language	-0.028	-0.004	0.002	-0.100	-0.150 *	0.011	-0.113 **	-0.196 ***	-0.149 ***
Intl. agreements	0.000	0.000	0.000	0.005 **	0.008 **	0.000	0.006 **	0.009 ***	0.004
CO <sub>2</sub> emissions	-0.008	-0.002	-0.001	0.127 **	0.142 *	0.037	0.471 ***	0.391 ***	0.208 **
Freedom House	-0.012	-0.002	0.001	-0.041 *	-0.024	-0.046 **	-0.017	-0.027	-0.003
Right government	0.009	0.003	0.005	0.040	-0.103	0.043	-0.028	-0.060	-0.033
Left government	0.023	0.005	0.002	0.067	0.096	0.059	0.078	0.084	0.129 *
Agriculture	0.005 *	0.001	0.000	0.001	-0.001	-0.002	0.000	-0.001	0.002
Vulnerability	-0.119 ***	-0.010	-0.005	0.012	0.056	0.025	-0.031	-0.006	-0.012
UNGA voting	0.350	-0.005	0.005	-0.114	-0.425	0.088	-1.129 *	-0.736	-1.683 **
Colony	0.079	-0.003	-0.016	-0.119	-0.268	0.002	-0.014	-0.114	0.006
Fossil exports	-0.162	-0.041	-0.024	-0.795	0.229	-0.376	0.427	0.796 *	0.396
Forests	-0.126	-0.026	-0.026	0.078	0.308	0.171	-0.088	0.197	-0.245
Renewables	-0.096	-0.026	-0.023	-0.194	-0.316	-0.089	-0.612 ***	-0.399 **	-0.504 ***
Flexible mechanisms	0.013	0.002	-0.014	0.072	-0.122	0.097	0.076	0.159	0.096
Trade with China							-0.006		
Trade with Tuvalu						-27.685			
Trade with USA		0.042							
Aid from USA		-1.624							
Aid from EU	-0.691								
Trade Saudi Arabia									-0.874
Observations	178	177	178	178	178	178	178	178	168
Left censored	125	145	158	130	136	138	119	124	116
Log likelihood	-103	-60	-63	-13	-131	-102	-140	-142	-119
Pseudo R <sup>2</sup>	0.42	0.56	0.42	0.39	0.27	0.35	0.42	0.34	0.40

Notes: Tobit regressions, values are for marginal effects, with  $y_{ij}=0$  if  $x_i'b + u_i \leq 0$ , and  $y_{ij} = x_i'b + u_i$  otherwise. Significance at the 1%, 5% and 10% level is denoted by \*\*\*, \*\* and \* respectively. Constant not reported. For variable descriptions, see Appendix A, Table A2.

**Table B2: Determinants of supportive statements (in %), additional tobit regressions**

Support for:	EU	USA	Russia	AOSIS	African Group	Tuvalu	China	India	Saudi Arabia
Annex I	0.142	0.311 **	1.130 ***	-0.296 ***	-0.457 ***	-0.432 ***	-0.535 ***	-0.663 ***	-0.110
No of interventions	0.005 ***	0.003 ***	0.004 ***	0.005 ***	0.005 ***	0.005 ***	0.008 ***	0.006 ***	0.005 ***
Population	0.000 ***	0.000 ***	0.000 **	0.000 ***	0.000 *	0.000 **	0.000 ***	0.000 **	0.000
GNI per capita			-0.012 **				0.006 **		0.009 ***
Education	0.003 **		0.005 *	-0.004 **					
English language	0.193 ***	0.082 **					0.112		
French language							-0.202 **	-0.315 ***	-0.205 ***
Intl. agreements				0.004 *			0.008 ***	0.010 ***	0.005 **
CO <sub>2</sub> emissions				0.166 ***	0.254 ***	0.063	0.625 ***	0.440 ***	0.233 ***
Freedom House		-0.032 ***		-0.047 **		-0.075 ***			
Right government									
Left government		0.046					0.104		0.156 **
Agriculture		0.005 ***							
Vulnerability	-0.119 ***	-0.089 ***	-0.190 **						
UNGA voting	0.392						-1.326 *		-2.205 ***
Colony		0.009	-0.173						
Fossil exports				-0.607		-0.739			
Forests		-0.181 **	-1.095 ***		0.320				-0.325 **
Renewables		-0.163 *	-0.726 **				-0.857 ***	-0.472 *	-0.624 ***
Flexible mechanisms		0.057 *		0.105				0.175 *	
Trade with USA		0.344 **							
Aid from USA		-12.660 ***							
Trade Saudi Arabia									-1.054 *
Observations	178	177	178	178	178	178	178	178	168
Left censored	125	145	158	130	136	138	119	124	116
Log likelihood	-108	-62	-67	-116	-138	-105	-142	-146	-121
Pseudo R2	0.39	0.54	0.38	0.38	0.23	0.33	0.41	0.32	0.39

Notes: Tobit regressions, values are for marginal effects, with  $y_{ij} > 0$ . Results after stepwise selection of the explanatory variables. Significance at the 1%, 5% and 10% level is denoted by \*\*\*, \*\* and \* respectively. Constant not reported. For variable descriptions, see Appendix A, Table A2.

**Table B3: Determinants of supportive statements (in %), additional tobit regressions**

Support for	EU	USA	Russia	AOSIS	African Group	Tuvalu	China	India	Saudi Arabia
Annex I	0.182	0.189	0.745 **	-0.304 ***	-0.399 **	-0.339 ***	-0.508 ***	-0.589 ***	-0.096
No of interventions	0.005 ***	0.003 ***	0.003 ***	0.005 ***	0.005 ***	0.004 ***	0.007 ***	0.006 ***	0.005 ***
Population	0.000 ***	0.000 ***	0.000 ***	0.000 **	0.000	0.000 **	0.000 ***	0.000 **	0.000
GNI per capita	0.004	0.002	-0.010 *	0.003	-0.004	-0.005	0.001	-0.004	0.008 **
Education	0.003 *	0.001	0.006 *	-0.005 **	-0.004	0.000	0.002	0.003	0.000
English language	0.151 **	0.090 **	0.168	0.016	0.202	0.016	0.114	0.082	-0.008
French language	-0.031	-0.034	0.044	-0.110	-0.205	0.015	-0.170 *	-0.264 **	-0.210 ***
Intl. agreements	0.000	0.001	0.005	0.005 **	0.010 **	0.001	0.008 **	0.011 ***	0.005 *
CO <sub>2</sub> emissions	-0.008	-0.013	-0.050	0.128 **	0.172 *	0.048	0.608 ***	0.441 ***	0.244 ***
Freedom House	-0.013	-0.017	0.051	-0.042 *	-0.029	-0.060 **	-0.022	-0.030	-0.004
Right government	0.010	0.026	0.172	0.041	-0.124	0.056	-0.035	-0.067	-0.039
Left government	0.024	0.042	0.073	0.068	0.116	0.076	0.100	0.094	0.151 *
Agriculture	0.005 *	0.006 ***	-0.001	0.001	-0.001	-0.003	0.000	-0.001	0.002
Vulnerability	-0.123 ***	-0.078 ***	-0.165 **	0.012	0.068	0.033	-0.041	-0.007	-0.014
UNGA voting	0.365	-0.042	0.173	-0.115	-0.513	0.114	-1.454 *	-0.829	-1.967 **
Colony	0.084	-0.021	-0.273 *	-0.117	-0.306	0.003	-0.019	-0.125	0.008
Fossil exports	-0.169	-0.316	-0.830	-0.803	0.276	-0.488	0.550	0.896 *	0.463
Forests	-0.132	-0.197 **	-0.899 ***	0.078	0.372	0.222	-0.114	0.222	-0.286
Renewables	-0.100	-0.199 **	-0.812 ***	-0.196	-0.382	-0.116	-0.788 ***	-0.450 *	-0.589 **
Flexible mechanisms	0.013	0.016	-0.480	0.072	-0.147	0.126	0.098	0.178	0.112
Trade with China	-0.719								
Trade with Tuvalu		0.320 *							
Trade with USA		-12.464 ***							
Aid from USA						-35.919			
Aid from EU							-0.008		
Trade Saudi Arabia									-1.021 *
Observations	178	177	178	178	178	178	178	178	168
Left censored	125	145	158	130	136	138	119	124	116
Log likelihood	-103	-60	-63	-13	-131	-102	-140	-142	-119
Pseudo R2	0.42	0.56	0.42	0.39	0.27	0.35	0.42	0.34	0.40

Notes: Tobit regressions, values are for marginal effects, with  $y_{ij} > 0$ . Results including all explanatory variables in the regressions. Significance at the 1%, 5% and 10% level is denoted by \*\*\*, \*\* and \* respectively. Constant not reported. For variable descriptions, see Appendix A, Table A2.

**Table B4: Estimating the propensity score: probit regression for Annex I membership**

	Coefficient	Marginal effect	P-value
GNI per capita	0.032	0.001	0.368
Education	0.071	0.001	0.017
Vulnerability	-0.096	-0.002	0.792
CO <sub>2</sub> emissions per capita	-0.048	-0.001	0.323
Renewables	1.157	0.020	0.205
Left government	-0.665	-0.012	0.215
Right government	-0.876	-0.015	0.170
Freedom House	0.072	0.001	0.684
UNGA voting	6.845	0.120	0.003
Intl. agreements	0.038	0.001	0.039
English language	-1.076	-0.016	0.118
Constant	-9.870		0.005
Observations	179		
Log likelihood	-25.35		
Pseudo R <sup>2</sup>	0.71		

Note: For variable descriptions, see Appendix A, Table A2.