The institutionalization of a cleavage:
How differential treatment affects state behavior in the climate negotiations

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Abstract

Differential treatment is a key norm in multilateral environmental agreements. Its main objective is to increase compliance and reduce the free-rider problem by apportioning the costs and benefits of implementation more equitably across the parties in an agreement. The question of how to differentiate those burdens is inextricably linked to national interests, and while in some instances differential treatment is well designed and facilitates cooperation, in other cases, a rigid divide – or cleavage – leads to a stalemate and constant conflict. This article studies the consequences of differential treatment as institutionalized under the United Nations Framework Convention on Climate Change (UNFCCC). Previous research has shown that the separation of UNFCCC parties into two opposing groups has deepened the polarization in the negotiations. We identify two causal mechanisms that may have driven this polarization, namely socialization through material incentives and the formation of group identity. We draw on an original dataset that records (dis-)agreements between country pairs, coded from negotiation summaries between 1995 and 2013. Using a Relational Events Model, we show that the division of UNFCCC parties into Annex I (with obligations) and non-Annex I (without obligations) is related primarily to material incentives and less to group identity formation.

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Data statement

The data underlying this article are available on the ISQ Dataverse, at https://dataverse.harvard.edu/dataverse/isq.

Introduction

A question that engages the international relations literature is what causes stasis or change in negotiations, since change only happens when state leaders have a political, social, or economic incentive to do so. When it comes to climate change, due to its global public good nature, "every country has an incentive to shirk, to free-ride (…) and the option of not cooperating typically is more attractive than cooperation" (Keohane and Oppenheimer 2016, 142). At the same time, many environmental problems, including climate change, are a matter of fairness between the global North and South. Industrialized countries have historically both a greater responsibility for global pollution as well as the capacity to mitigate it. In contrast, many developing countries are more vulnerable to environmental problems – most significantly, climate change.

Differential treatment, i.e., the introduction of groups of countries with differentiated rights and obligations, takes these two concerns into account: (1) the need for cooperation and actual change, while (2) respecting fairness. It has therefore become common practice and a key norm in international law and specifically in multilateral environmental agreements (MEAs). Differential treatment can be traced back to the 1972 United Nations Conference on the Human Environment, where developing countries raised concerns about environmental protection measures hampering their socio-economic development. The 1992 Rio Declaration highlighted the different degrees of national responsibility for environmental protection, given their respective contributions to environmental pollution and their domestic circumstances. The main goal of differential treatment is to increase compliance and reduce the incentives for free-riding, by apportioning the costs and benefits of implementation more equitably across the various parties of an agreement (ibid., Handl 1991, 64; Sand 1990, 220–21).

In practice, differentiation usually consists of granting a specific group of countries less stringent obligations, different time schedules for compliance, and international financial, technological, or capacity-building support (Rajamani 2006).

However, in the absence of appropriate justification, differential treatment may become problematic in the long run. It may imply higher administrative costs given the greater complexity of the regime. Moreover, assessing how to differentiate responsibilities in a fair manner is a matter of debate and conflict that coincides with states' interests and structural power within a regime. In some instances, differential treatment is well designed and facilitates cooperation, but a rigid divide may also lead to stalemate and ongoing conflict. As a result, the long-term effectiveness of a regime may be compromised because weak (or even non-existent) obligations for some countries are likely to preclude them from making any progress towards the goal of the agreement (Handl 1991, 65).

A prominent example of successful differential treatment is the ozone protection regime with its refined burden-sharing arrangements. Scholars widely agree that the success of the 1987 Montreal Protocol is due to differential treatment provisions that addressed the concerns of developing countries by granting them extended compliance deadlines and technical assistance, but which did not exclude them from obligations completely (Rajamani 2012; Bafundo 2006).

Since the beginning of the climate negotiations, however, justice and equity have been linked to the differentiation of responsibilities and become a key area of contestation (Okereke and Coventry 2016; Castro et al. 2014). The outcome was a far more rigidly designed regime that differentiated its central obligations across broad country groups (Rajamani 2012). The 1992 United Framework Convention on Climate Change (UNFCCC) and the 1997 Kyoto Protocol included several provisions for burden sharing. This differentiation was based on countries' per capita emissions and historical responsibility, which underlie the UNFCCC principle of 'common but differentiated responsibilities'. Practically speaking, this led to a rigorous differentiation of obligations between the global North and South. Member states were classified as 'Annex I' countries with legally-binding greenhouse gas reduction and reporting commitments, and 'non-Annex I' countries without such commitments.[1]

It was clear from the outset that commitments which excluded major developing countries would not be sufficient to address climate change effectively. Instead, these were regarded as the starting point of a 'dynamic instrument for long-term climate policy' (Depledge 2002, 41) that would evolve to accommodate stronger Annex I country commitments and new actions from non-Annex I countries. However, this rigid differentiation proved challenging to overcome and remained in place until at least 2012, when voluntary mitigation by developing countries was introduced. Eventually, the 2015 Paris Agreement formally abolished the rigid differentiation between developed and developing countries and introduced a more dynamic self-differentiation (Maljean-Dubois 2016). Nevertheless, in practice, the divide between Annex I and non-Annex I countries is still evident in the ongoing negotiations (ibid., Bodansky and Rajamani 2018).

Differential treatment is not confined to the environmental arena. It is, for example, a key feature of World Trade Organization negotiations (Page and Kleen 2005). In addition, Bukovansky et al. (2012) apply the concept to nuclear proliferation and the protection of the global financial system following the 2008 crisis. As a feature of regime design, differential treatment has been the object of substantial research among international law scholars (e.g. Winkler and Rajamani 2013; Dimitrov et al. 2019).

[1] The Annex I of the Convention listed the countries expected to take the lead in addressing climate change, including most of the OECD member states and the economies in transition. All other UNFCCC parties were considered as non-Annex I. Table A7 in the supplementary information lists the members of each group.

However, from a political science perspective, only a handful of studies have tried to understand how differential treatment influences negotiation dynamics (Castro et al. 2014; Okereke and Coventry 2016; Prys-Hansen and Franz 2015), namely the interaction between parties to an international organization or agreement. This article aims to improve our understanding in this field by disentangling the causal mechanisms that link differential treatment and negotiation behavior. To achieve this, we rely on constructivist and rationalist theories of socialization within intergovernmental organizations (IGOs) (see, e.g., Schimmelfennig 2005; Bearce and Bondanella 2007).

Looking specifically at the climate regime, we provide empirical evidence about the extent to which and the reasons why the introduction of a rigid differential treatment has led to an increased manifestation of two opposing blocs in the negotiations. Several studies have discussed differential treatment as one reason for the stalemate in the climate negotiations (Depledge 2009; Gupta 2010; Prys-Hansen and Franz 2015); however, this paper offers theoretical justification and empirical proof of why this is so. On a general level, we contribute to the broader question of how institutional design and historic path dependencies are linked to stasis (or change) in international negotiations as well as countries' incentives to cooperate and coordinate their activities.

Our analysis draws on a new dyadic dataset that records the agreements and disagreements between country pairs over time, coded from reports of the climate negotiations between 1995 and 2013 published in the Earth Negotiations Bulletins (ENB) (IISD 1995-2013). The dyadic design allows us to investigate the effect of membership in the Annex I or non-Annex I group on cooperative or conflictual behavior between countries. Our core argument is informed by the "constructed peer group" hypothesis (Castro et al. 2014), which suggests that differential treatment can potentially deepen existing cleavages between opposing groups in international negotiations. Specifically, we take a closer look at two important mechanisms that may explain the causal link between differential treatment and negotiation behavior: (1) group manifestation due to the creation of new material incentives attached to group membership and (2) group manifestation by a long-term process of common identity formation and socialization.

An extensive set of controls allows us to unravel the effect of group construction from the influence of countries' structural characteristics, bilateral ties, and typical (social) behavior in negotiations. The long time series and information regarding negotiation topics allow us to test our hypotheses about the two mechanisms using a Relational Events Model, which combines event history analysis with social network analysis. Event history analysis helps us to investigate patterns of repeated cooperative and conflictual negotiation interactions over time; network analysis allows us to account for the interdependency of these interactions and operationalize socialization through intragroup vs. intergroup reciprocation of cooperation.

Our findings confirm the constructed peer group hypothesis and show that in the UNFCCC negotiations, countries are substantively more likely to cooperate with a country from the same group than with one from the other group. While the literature often explains cooperation with shared interests that arise from similar contexts (Sprinz and Vaahtoranta 1994, Bättig and Bernauer 2009), our results show that cooperation is, on average, more likely among the politically, geographically, and socio-economically diverse group of non-Annex I countries than the relatively homogenous group of Annex I countries. Thus, within the group of non-Annex I countries, the motivation to cooperate, i.e., to advocate a common position, must be triggered by something other than similarities in wealth, the capability of institutions, or

vulnerability to climate change. Our analysis clearly supports the idea that this group effect is related to the creation of new incentives because of differential treatment. It highlights the important role that the privileges granted to the non-Annex I group of countries –exempted from emission reduction obligations – might play in group manifestation. We argue that maintaining this incentive created a new shared interest to cooperate among the members of the more privileged group. In contrast, our results do not support the hypothesis that the group effect is related to a process of socialization within the group over time.

In this article, we offer substantive contributions to (1) the literature on multilateral negotiations, by taking a closer look at the potential effects of institutional design on negotiation behavior, (2) to the literature on socialization in IGOs, by testing rationalist and constructivist mechanisms of socialization within an IGO, and (3) to discussions on the drivers of change and stasis – and eventually of cooperation – within multilateral negotiation processes. Empirically, we demonstrate the benefit of inferential, temporal network analysis to study multilateral negotiations, which, we argue, allows us to reflect better the actual negotiation dynamics, along with a new original dataset of the climate change negotiations.

How differential treatment of parties may affect negotiation behavior

Socialization to international norms is a topic that concerns many theoretical schools in international relations (Johnston 2001). It can be defined as the "process by which states internalize norms arising elsewhere in the international system" (Alderson 2001, 417). It is commonly used to investigate how states emulate rules and norms to fit into groups, including supranational organizations like the European Union and IGOs (Park 2014). Socialization is considered a social influence process leading to a change in behavior through material incentives (realists/rationalists) or through the habituation of new norms and ideas (constructivists). In neorealism, socialization is a competition and selection process in the self-help system. Countries that do not follow the logic of the international system will be weeded out, while those that remain will share 'realpolitik behavioral traits' (Johnston 2001, p. 489). For rationalists, socialization is a process of reinforcement that is characterized by exogenous, self-interested political preferences and strategic action (Schimmelfennig 2005). For constructivists, socialization occurs over time through the internalization of new norms, when countries repeatedly interact and thereby develop shared understandings of appropriate behavior (e.g., Checkel 2005). In the long term, a new behavior, norm or shared idea may become established, causing countries to review their identities. In the context of IGO research, some scholars have concluded that member states become more similar over time and convergent in their interests (e.g., Bearce and Bondanella 2007; Greenhill 2010).

Scholars of socialization primarily investigate how the involvement in IGOs turns state behavior towards greater international cooperation. However, one might also ask whether socialization could lead to stasis and institutionalized conflict. In this context, the role of differential treatment in shaping the quality of cooperation in a MEA is a new and interesting issue. According to Bukovansky et al. (2012), for example, the world community comprises a stratified society of countries 'classified' into different roles that go beyond those given by their material power. Differential treatment can be conceptualized as such a classification that, in turn, shapes relations between countries. Going a step further, Pouliot (2016, 37) argues that rather than supporting sovereign equality, multilateral diplomacy creates a

stratified society that not only reflects power inequalities but also creates them by reinforcing hierarchical relations between the global North and the South. Hence, countries are not only 'norm-takers' that respect and follow the international order, but they are also able to shape this order actively as 'norm-makers' and 'norm-shapers' (Jinnah 2017) that can form international agreements according to their respective positions and interests.

These positions and interests adopted and expressed by states in multilateral negotiations, how they react to their peers, and the outcome of these negotiations depend partly on countries' characteristics and related preferences (Sprinz and Vaahtoranta 1994). However, the existence of institutionalized country groupings may also have an effect of its own, which has been referred to as the constructed peer group hypothesis by Castro et al. (2014). The construction of such groups by the regime itself results in new commonalities among member countries. New incentives to 'fight' for common goals are created while a group identity like that of a peer group develops, analogous to what socialization theory suggests is the effect of participating in IGOs (e.g. Bearce and Bondanella 2007). In turn, this affects the negotiation dynamics and makes countries behave more cooperatively towards those within their own group, and more contentiously towards members of the other group(s). This eventually leads to the persistence of these constructed groups, even for purposes other than those intended initially. In our analysis of the climate negotiations, we thus formulate the following general hypothesis:

Hypothesis 1: All else being equal, countries are more likely to interact cooperatively in the climate change negotiations if they belong to the same constructed peer group (Annex I or non-Annex I) (group effect hypothesis).

Following Park's (2014) suggestion, we combine a rationalist perspective on socialization with constructivist ideas. We theorize that this group effect happens because of two main causal mechanisms –socialization due to new incentives and socialization within peer groups. The following sections describe our main theoretical arguments related to these two mechanisms.

Differential treatment and the creation of new incentives

This first causal mechanism takes a rationalist perspective on socialization, which considers material incentives and strategic considerations (Schimmelfennig 2005). Lasting financial implications may result from how differential treatment is institutionalized (Jinnah 2017), since the created groups have different sets of obligations and privileges related to the distribution of the costs and benefits in an international agreement. For example, group members can receive privileges, such as less stringent obligations, more time to comply with them, or financial support (Rajamani 2006). These privileges drive group members to protect their preferential treatment, and to argue for the continuation of the status quo or for the expansion of their preferences. Conversely, members of the group with more substantial financial or environmental obligations may well lobby for abolishing or lessening differential treatment, for example, by decreasing the number of countries with privileges, cutting back those privileges, or reducing their own commitments. In either case, group construction creates new material incentives for both groups and, within them, a common purpose at the negotiating table. In other words, differentiated provisions in a treaty will create "different incentive frameworks to different countries" (Swanson 2001, 130).

The outcome is a convergence of negotiation goals and positions within the group, leading to more intragroup cooperation and a greater chasm between the groups.

Due to their rigid differential treatment framework, the climate negotiations are an excellent example of how differential treatment can create new incentives. Annex I membership implies costly responsibilities and duties to reduce and report greenhouse gas emissions, while non-membership confers privileges. For non-Annex I members, this created a new goal of safeguarding those concessions and an incentive to fight for maintaining the status quo (Gupta 2010). The design of differential treatment under the Kyoto framework was so inflexible that it did not allow non-Annex I countries to formulate their own voluntary emission reduction targets even if they had wanted to. A case in point is Argentina (Bouille and Girardin 2002). In 1998, the country announced its wish to establish a voluntary emission target, yet neither the UNFCCC nor the Kyoto Protocol had established provisions for voluntary targets by non-Annex I countries. The only way of formulating their own target would have been to join the Annex I group, but this would have had far-reaching consequences. For example, it could have affected the flow of development aid Argentina was receiving or pressured other non-Annex I countries to follow Argentina's example. Hence, within the UNFCCC, the Annex I / non-Annex I divide established clear financial incentives for the non-Annex I group not to change their composition. Therefore, the entire non-Annex I group unites to maintain these privileges since any change in a non-Annex I country's status would increase the pressure on everyone else do the same. A threat to an individual non-Annex I country is thus perceived as a threat to all.

We argue that if the peer group effect is related to the creation of these new incentives, it should be particularly noticeable in negotiation issues that are associated with the granting of privileges. In the case of climate change, the most important ones are mitigation-related commitments. This leads to the following empirical implication, which allows us to test the role of new incentives. If new incentives caused by differential treatment are a causal mechanism driving the above-hypothesized effect of group membership in the negotiations, this effect should be stronger when discussions relate directly to the imposed differential treatment. In our case, this refers to mitigation commitments rather than to other less divisive issues such as adaptation, capacity building, technicalities behind emissions reporting, or the organization of the negotiation process itself.

This leads us to our second hypothesis:

Hypothesis 2: The effect of group membership is more noticeable in discussions related to differential treatment privileges than for other less divisive issues (incentives hypothesis).

Differential treatment and socialization in groups

The second causal mechanism relates to constructivist ideas since it connects intensified socialization within the groups to the habituation of norms and the development of a group identity over time. Countries in a given group may meet more often and exchange positions. Since they already share some common characteristics, they will feel more closely related. Through experiments, social psychologists have shown that group discussion increases the likelihood of cooperation (Orbell et al. 1988). Researchers of IGOs have adopted these arguments for explaining strengthening ties between all members of IGOs. They argue that membership in IGOs allows countries to communicate more often and

share information about interests and intentions; this generates a sense of mutual identity that enhances cooperation (see, e.g., Keohane 1986; Dorussen and Ward 2008). The institutional socialization hypothesis goes even further, suggesting that continuous exchanges at IGO meetings make member states internalize the norms and rules accepted within that IGO. This process affects their identity over time, thus making their interests converge (Johnston 2001; Checkel 2005; Bearce and Bondanella 2007).

Consequently, this induces a more trusting atmosphere conducive to fruitful deliberations. Once a group exists, socialization reinforces cohesion among its members, increasing the likelihood of a unified group position. If, in addition, the group is threatened from the outside, questioning its very foundations and *raison d'être*, this may bind members together even more tightly.

Within the UNFCCC, the Annex I and non-Annex I divide generated two new separate fora for discussion. Since non-Annex I countries enjoy some privileges, their status has been challenged repeatedly, resulting in a strong response by the group as a whole. In addition, membership in the non-Annex I group of countries is remarkably similar to membership in the Group of 77 and China (G77), a broad coalition that has historically represented the views of developing countries in several UN fora (Vihma et al. 2011). Non-Annex I countries, therefore, meet frequently as a group. Over time, they may not only develop a common understanding of negotiation issues and common positions, but also increase trust and form a group identity within the regime. The literature has identified a sense of shared identity within the G77 as one reason why the group still holds together, despite growing economic differences between its members (Vihma et al. 2011). A similar effect may also be noticeable for the group of Annex I countries, composed mainly of OECD member states. For example, the OECD has a history of coordinating research on international climate policy through its Climate Change Expert Group.

Beyond these formal groups and their physical meetings, however, we believe that it is also the construction of the groups itself – the creation of categories and labels ("Annex I", "non-Annex I"), with their attached obligations and privileges, as well as the continuous use of those labels in the negotiations and decisions that can lead to a growing sense of group identity. This may be especially the case for the non-Annex I countries, whose label is associated with benefits and privileges.

Hypothesis 3: The effect of group membership becomes stronger over time as socialization occurs (socialization hypothesis).

The result of these two processes – which both reinforce intragroup cooperation and intergroup conflict – is a potential stalemate and ultimately an inability to address climate change (Castro et al. 2014).[2] Thus, while Annex I lists the countries that should lead the efforts to reduce greenhouse gas emissions, in practice, it has evolved into a rigid classification with two static groups. Accordingly, the Annex I / non-Annex I dichotomy has survived for over two decades, despite the drastically changing economic and environmental realities of UNFCCC member states.

[2] See also Depledge (2002; 2009) and Gupta (2010, 641) for anecdotal evidence supporting these claims.

Data and methods

Measuring cooperation and conflict in the climate negotiations

Cooperation and conflict are daily features of long-term negotiation processes. Negotiations encompass many different types of interaction – verbal and written, as well as public and private. We choose a specific type of interaction between UNFCCC parties to test empirically whether and why Annex I or non-Annex I group membership affects countries' negotiation behavior beyond their own characteristics and related preferences.

Our chosen data records whether a country has acted in a cooperative or conflictual way towards another country in its verbal statements. What is the actual relevance of such verbal statements in negotiations? Making statements is not mandatory, so any party can choose not to express its opinion on a given issue. This can happen because they are not familiar with the topic, do not care sufficiently about it, or feel that others have already expressed the same position. Statements are also non-binding – parties can change their position and communicate this at any time (Yamin and Depledge 2004, 440). Consequently, they can be used strategically to obtain a better bargaining position (Morrow 1999). However, these verbal exchanges are at the heart of reaching a compromise and, ultimately, an agreement. Tit-for-tat exchanges about micro-level issues have been found to increase the likelihood of reaching a consensus (McKibben and Western 2014). Therefore, such statements (and how parties react to one another) clearly matter in the negotiation process.

Our data were obtained from the summaries of all UNFCCC negotiations between 1995 and 2013 as published by the International Institute for Sustainable Development in its ENB (IISD 1995–2013).[3] The ENB provides detailed, daily reports of the negotiations. For all meetings open to observers, the reports contain summaries of statements made by the different delegations on behalf of their countries and the respective reactions of others. We used these summaries to code how countries interacted with each other in the negotiations. In so doing, we distinguished between cooperative behavior (speaking on behalf of, supporting, or agreeing with one another) and conflictual behavior (delaying, opposing or criticizing positions or statements). In addition, we coded the topics or issue areas for each of these interactions.[4]

This choice of data source was based on data availability and consistency over time. While not offering full transcripts, the ENB are the most complete and regular reports of the climate change negotiations available, and the objective and consistent way they have been written over the years makes them an excellent source for text coding. However, they have limitations in that they simply present a summarized version of the discussions, and it is difficult to establish what was not reported. Furthermore, they generally report meetings open to observers, and whenever they cover closed meetings, the statements are not attributed to any particular party. Nonetheless, given their regularity and consistency over time, we deemed them to be the best data source available for our analysis.

[3] The selected period covers all UNFCCC negotiations before a first draft of the Paris Agreement was produced. This is the time in which countries were divided into the Annex I and non-Annex I groups. This differentiation was abolished by the Paris Agreement, a first draft of which was officially negotiated in 2014, before its final adoption in 2015.

[4] These topics range from substantive issues such as 'mitigation', 'adaptation', and 'technology', to discussions regarding the 'organization' of the negotiation process.

As an example of our coding of conflictual and cooperative behavior, an extract from the ENB dated 3 November 1999 reads: 'The EU said a possible way of making all countries limit their GHG emissions is to agree on increasing global participation after the first commitment period. CHINA and INDIA said Annex I countries have the main responsibility.'

This text excerpt was coded as *opposition* (conflictual behavior) by China and India towards the EU and *agreement* (cooperative behavior) between China and India. The topic was coded as *mitigation*, given that the discussion was about which countries should reduce greenhouse gas emissions. We followed this coding scheme for the whole negotiation process between 1995 and 2013 to obtain a variable that recorded all *negotiation events* in which each country expressed support or opposition towards any of the other participating countries. Our unit of analysis is such a negotiation event, characterized by a pair or dyad of interacting countries, the type of interaction (cooperative or conflictual), its topic, and the date on which it took place. The dataset covers 62,097 such instances between 213 countries and coalitions between 1995 and 2013.[5]

Four coders contributed to the data collection process, which was carried out by hand. To ensure coding consistency, all coders started by coding the same sample of text. The results were compared and discussed to reach a common understanding of the coding rules. Later, random portions of text were double coded in order to test for intercoder reliability. For the type of interaction, Cohen's kappa ranged from 0.90 to 0.98, indicating very high reliability. A summary of the codebook and descriptive statistics of the dataset of cooperative and conflictual interactions are presented in the supplementary information. Further details are available in the original dataset (Castro 2017).

The Relational Events Model

To test the hypotheses outlined above, we apply a Relational Events Model (REM) proposed by Lerner et al. (2013). REMs are models for dyadic and typed events that help to uncover 'rules that govern behavior' in a series of interactions between social actors (Lerner et al. 2013, 11). We define such an event as a tuple $e = (a_e, b_e, w_e, t_e)$ where a_e is the initiating actor (the *sender*), b_e is the addressed actor (the *target*), w_e is the quality of an event (the *event type*), and t_e the *time* when e happens (Lerner et al. 2013). In our dataset, senders and targets are the countries and coalitions involved in the UNFCCC climate negotiations. The type of an event is defined by a dummy variable (*cooperation*) indicating whether an interaction, i.e., a negotiation event, is cooperative (1) or conflictual (0) in nature. Time captures the date of the negotiation events to the exact day.

The basic assumption of a REM is that both the manifestation and the type of an event e_i depend on earlier events in an observed *event sequence* $E = (e_1, \dots, e_n)$. Hence, the probability of an observed event e_i only depends on events that happened earlier. This dependence is captured by a dynamic network of negotiation events covering the essential aspects of past negotiation activities between the same or other dyads of countries and coalitions. All negotiation events that

[5] Note that in the UNFCCC negotiations, countries frequently join forces with like-minded peers to form negotiation coalitions, such as, for example, the Alliance of Small Island States (AOSIS), the African Group of Negotiators, or the Environmental Integrity Group. In our analysis, we treat these coalitions as additional actors to the individual countries.

happened before e_i, therefore, determine the negotiation network G_{ei}, which captures the number of cooperative or conflictual interactions between all country pairs.

The REM enables us to investigate the causal mechanisms underlying the formation of the stream of negotiation events. The model disentangles factors that explain why actor A negotiates more or less frequently with actor B, and why A engages more in cooperative or conflictual negotiation events with B. These factors are either exogenous (such as a country's characteristics) or they emerge endogenously from the structure of previous events. These previous events form a network of past negotiation interactions.

The REM model consists of two parts. The first regression is a logit that models the conditional probability that an event has type w_e (i.e., is cooperative or conflictual) given that it takes place, involving country a_e as sender and country b_e as target at time t_e. A vector of parameters $\theta^\mu = \theta_1^\mu, ..., \theta_n^\mu$ related to a set of exogenous and endogenous variables determines the event type stochastically. The exogenous covariates are country-specific or dyadic characteristics. The endogenous variables are the configurations of a country's past interactions – so-called network statistics. Equation 1 summarizes the components of the first model.

$$f_\mu(E \mid \theta^\mu) = \prod f_\mu (w_e \mid a_e, b_e, t_e, G_e, \theta^\mu) \qquad \text{Eq. 1}$$

For this first model, the dependent variable is the dummy *cooperation*, which takes the value of 1 if the negotiation interaction is cooperative, or 0 if it is conflictual. This part of the model is used to test the group effect and the incentives hypotheses.

The second part uses event history (survival) analysis to model the probability that a negotiation event between country a_e and country b_e happens at time t_e, given their past interactions and country-specific characteristics. In the survival model, the probability density of the event e_i at time t_e involving a_e as sender and b_e as target and $\theta^\lambda = \theta_1^\lambda, ..., \theta_n^\lambda$ being a vector of rate parameters that determine the event frequency stochastically is given by Equation 2:

$$f_\lambda(E \mid \theta^\lambda) = \prod f_\lambda (a_e, b_e, t_e \mid G_e, \theta^\lambda) \qquad \text{Eq. 2}$$

Using the whole sample of events, a negative, significant parameter indicates a decreased frequency of (both cooperative and conflictual) interaction and a positive, significant parameter implies an increased frequency of interaction. However, the socialization hypothesis argues that the group effect becomes steadily stronger over time, as the countries within each group develop a shared understanding of the negotiation, common positions, trust, and identity. To test this hypothesis, we need to investigate whether membership in the same group increased the frequency of cooperative interaction and decreased the frequency of conflictual interaction over time. Therefore, we ran the regressions first on a subsample including only the cooperative interactions (51,928 observations), and then on a subsample including only the conflictual interactions (10,169 observations).[6]

[6] These numbers reflect the actual negotiation interactions (*events*) that took place during the period studied. In order to run a survival model, however, also the *null events* – negotiation interactions that could have happened but did not – need to be considered. The R package *rem* (Brandenberger 2017) allows us to create those null events for the country pairs participating in the negotiations.

In this case, we apply two different dependent variables: the sequence of (true and null) cooperative negotiation events, and the sequence of conflictual negotiation events. We again use a logit regression to model the discrete-time hazard function of cooperative and conflictual events. In our main regressions we use year dummies to model the baseline hazard of cooperation or conflict, which allows for full non-parametric flexibility. In robustness checks (see Table A10 in the supplementary information) we also use a cubic polynomial as an alternative parameterization of the baseline hazard, as suggested by Gilardi and Füglister (2008, 422), or more fine-grained time dummies at the negotiation meeting level. The estimated model parameters reflect what factors trigger an increase or decrease in the frequency of interactions.

Independent variables

We begin our analysis by testing if the members of the same constructed peer group (Annex I or non-Annex I) are more likely to behave cooperatively towards each other in the negotiations (group effect hypothesis). Here, our central explanatory variable is *group membership*, a categorical variable that takes the value of 2 if both countries in the dyad belong to Annex I, 1 if they both belong to non-Annex I, and 0 if they belong to different groups. We expect membership in the same Annex to have a positive and significant effect on cooperation in the logistic regression model after controlling for further factors that may also affect cooperation, however, we allow for potential differences between the two groups.

The incentives hypothesis posits that the group effect should be stronger in discussions about topics related to new incentives created by the groups. Therefore, we expect the group effect to be stronger for discussions relating to mitigation commitments. To test this hypothesis, we introduce one additional explanatory variable. The *mitigation* variable is a dummy that takes the value of 1 if the current negotiation event is about emission reduction commitments and 0 otherwise. We use interactions between the variables *group membership* and *mitigation*: If the effect on cooperation of being in the same Annex (in the type model) is stronger when *mitigation* takes the value of 1, we can support the incentives hypothesis.

The socialization hypothesis claims that the group effect becomes stronger over time. Consequently, we use an interaction between *group membership* and the *negotiation year* to test the effect of being in the same Annex on how the frequency of cooperative interactions or the frequency of conflictual interactions develops over time. For our hypothesis to be supported, we would expect a positive and significant interaction effect in the regressions on the cooperative interactions and a negative and significant interaction effect in the regressions on the conflictual interactions.

Endogenous controls

It is important to consider the dependencies between the negotiation events. During a lengthy negotiation process, the same pairs of countries may interact repeatedly. These repeated interactions are interdependent. In addition, delegates frequently congregate in small groups to discuss issues and find compromises, and witness first-hand who supports or

This results in a dataset with over 12 million observations. Given that the estimations necessary to run the model took prohibitively long with such a large dataset, we relied on a sample of the null events: For each true event, only the past two years (730 past days) of corresponding null events were kept in the sample. This left us with a sample of 2.4 million (true and null) cooperative and 0.5 million (true and null) conflictual events.

opposes each specific verbal intervention. We would, therefore, expect certain endogenous patterns of network interaction to emerge over time. To account for these patterns, the REM includes network statistics. These statistics are calculated for each event in the sequence, based on the network of past negotiation events, and so reflect dependencies between the dyadic interactions.

Our model incorporates several statistics that capture critical network dependencies (Lerner et al. 2013; Hafner-Burton et al. 2009). *Reciprocity* measures the tendency of countries to reciprocate past behavior. Four *triad statistics* are used to reflect the degree of transitivity in the network of negotiation events. The concept of transitivity roots in structural balance theory, which predicts that the relationship between social actors depends on common friends and enemies. Hence, social actors are expected to form cooperative ties more often with friends of their friends or with the enemies of their enemies. In contrast, ties to enemies of their friends or to friends of their enemies are less likely. In the negotiation setting, we expect to see such patterns, too: If Party A frequently agrees with negotiation positions of Party C (i.e., they are "friends"), and Party B frequently agrees with negotiation positions of Party C, then it is likely that Party A agrees with Party B (the "friend of its friend"). In this analysis, two countries are defined as friends when they engage in a common cooperative negotiation event regardless of the direction of the interaction. Vice versa enemies are expected to be involved in conflictual negotiation events. Two degree statistics (*sender outdegree* and *target indegree*) measure how active countries are in the discussions. Finally, two similarity statistics (*sender similarity* and *target similarity*) reflect countries' similarity in terms of their social position within the negotiation network, given by the types and strength of their ties.[7] Figure 1 depicts these network dependencies graphically.

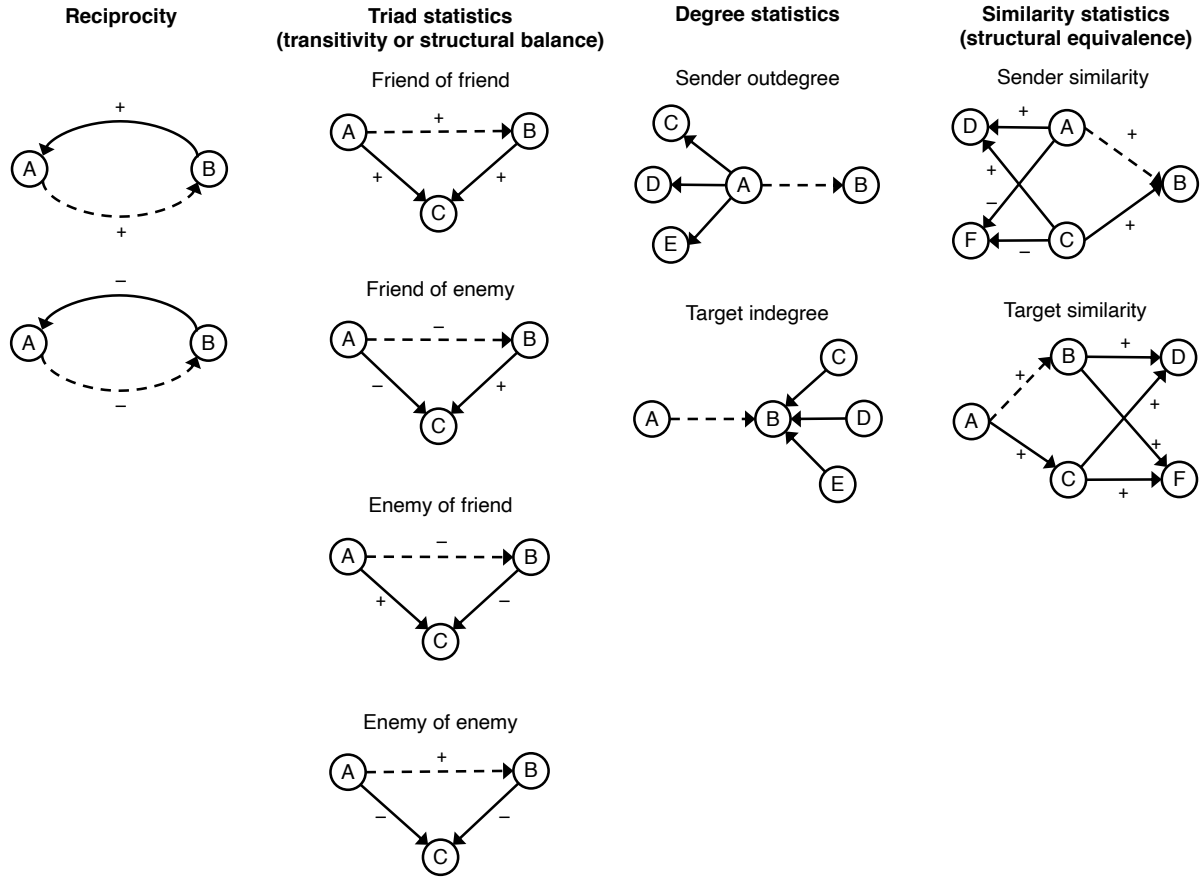
For all network statistics, a positive, significant parameter in the logistic regression indicates that the respective constellation is associated with an increased likelihood of cooperative negotiation events. In the survival model, a positive, significant parameter estimate implies that the respective constellation is associated with more frequent negotiation events between the same pair of countries.

Further, we rely on two of these network statistics to perform an additional test of the socialization hypothesis. The literature on social capital in policy networks (e.g., Berardo and Scholz 2010) emphasizes both reciprocity and transitivity as important mechanisms contributing to the development of social capital. Reciprocity "provides broader access to information about the other's expected behavior and the development over time of shared attitudes and values" (Berardo and Scholz 2010, 636), which increases confidence in a shared commitment to cooperate. Hafner-Burton, Kahler and Montgomery (2009) describe network analysis as a method for measuring socialization and norm diffusion in international relations, by focusing on the strength of ties between states and the build-up of communities or cohesive subgroups. Such subgroups are characterized by repeated cooperative intragroup interactions and conflictual intergroup interactions. As Berardo and Scholz (2010) argue, transitivity is a network statistic that indicates the formation of these denser, overlapping groups or (sub)networks. Such communities reduce monitoring and sanctioning costs and allow the emergence of trust owing to the repeated interactions within the (sub)group. Both these mechanisms are consistent with increasing social capital and cooperation. In line with these theoretical arguments, we assess the evolution of

[7] A more conventional way of accounting for intertemporal dependencies is to cluster the data by dyads. However, this would only account for repeated interactions of the same dyad over time. The network approach allows us, in addition, to control for structural dependencies between different dyads. If anything, this makes our testing of the group effect more conservative.

reciprocity and transitivity in the climate negotiations network as a further, more descriptive, empirical indication of the socialization hypothesis.

Figure 1: Simplified representation of network dependencies used in the analysis



Note: Dashed arrows represent the ties (negotiation interactions) that we want to explain; plus signs represent cooperative negotiation interactions; minus signs represent conflictual ones; unsigned ties indicate that either type of interaction is considered. In several of the graphs other tie directions are possible.

Source: Own graph based on Lerner et al. (2013) and Maoz et al. (2006)

Exogenous controls

To test our hypotheses, it is crucial to control for all relevant country and dyad characteristics because intrinsically similar countries will adopt similar positions and are more likely to act cooperatively in the negotiations. Also, countries that are generally more friendly towards one another – because of economic, political or historical ties –, may also be more likely to cooperate. We hypothesize an effect of Annex I/non-Annex I group membership on negotiation behavior beyond these intrinsic similarities and ties. Since we are trying to assess causality, the ideal counterfactual for

comparison is what would have happened in the negotiations in the absence of the Annex I / non-Annex I cleavage, but this situation is unobservable.

Fortunately, the countries within each of the groups are not homogeneous, and their characteristics vary over time. Even though Annex I countries are generally wealthier, have higher CO_2 emissions, and are less vulnerable to climate change, there is a wide overlap between both groups.[8] Besides, many non-Annex I countries – emerging economies and oil exporters – have become more prosperous and more polluting over time. This variation allows us to separate the effect of group construction from that of national characteristics and related preferences, assuming that we can control for all relevant variables that are correlated with Annex membership and negotiation behavior.

Consequently, we have included a broad set of controls. The most important ones are those that capture the intentions behind the construction of Annex I. The UNFCCC and Kyoto Protocol were based on the principle of 'common but differentiated responsibilities,' which implies that countries with better capabilities (logged *income*) and with greater responsibility for climate change (logged *CO_2 emissions*) should be leading efforts to combat climate change (Gupta 2010).

In addition, country size (logged *population*) is used to capture the role of country power resources in influencing the negotiations (Snyder and Diesing 1977). Dummy variables indicating whether the country's national or official language is *English* are included to model the delegation's negotiation skills, as language differences represent a barrier to communication and understanding in technically complex discussions. A measure of political freedom (*democracy*) is used to control for the possible effect of ideological influences on country positions and negotiation behavior. To reflect issue-specific material interests we also include an indicator of vulnerability to climate change (the *ND-Gain index*), a measure of a country's *forest area* (given that forests can be used to sequester carbon), and a measure of *fossil fuel-related rents*.

We also control for a set of variables related to the negotiation process. We add a dummy (*coalition member*) that controls for those interactions between a coalition and one of its members, and another one for interactions between two countries that are members of the *same coalition*.[9] In both cases, it is reasonable to expect that such interactions are generally more cooperative. Finally, we consider the role of bilateral ties among our dyads: *trade* and *aid* flows, and location in the *same* (geographic) *region*.

If not otherwise indicated, we measure all variables for each year. Given that our units are country dyads, we either include a control for the sender and one for the target, or the absolute difference between the sender and the target values. Since country coalitions are included as additional actors, we generate values for the respective variables by calculating the averages across their members. In the case of population, we use the sum rather than the average to

[8] Figures A2 to A8 in the supplementary information show comparative boxplots of the distribution of our main control variables by country group and over time.

[9] For example, a negotiation interaction between Tuvalu and AOSIS would be coded as 1 for *coalition member*, given that Tuvalu is a member of AOSIS. An interaction between Samoa and Tuvalu, which are both members of AOSIS, would be coded as 1 for *same coalition*. Note that we exclude the G77 from this control given the strong overlap between G77 and non-Annex I. Notwithstanding, if we used a version that did include G77, the effect of group membership remained, even though it became weaker (Table A8 of the supplementary information).

reflect the coalition's overall size. For English being a nationally spoken language, we use the mode.[10] We have tried to make our data as complete as possible, bearing in mind that our dataset includes small countries for which this is usually difficult. For this reason, for several variables, we have used additional data sources to minimize the missing values. After accounting for the remaining missing values, our total sample covers 58,461 actual negotiation events. For a more detailed description of all variables, their summary statistics and data sources, see Table A6 in the supplementary information.

To support our causal claims, in addition to considering this large set of controls, we ran the sensitivity analysis proposed by Cinelli and Hazlett (2020) to assess how likely it is that our regressions still suffer from omitted variable bias. A more detailed description of this analysis and its results can be found in the supplementary information.

Results

The climate negotiations network

To explore the negotiation event network visually and descriptively, we produced network graphs with ties reflecting all cooperative and conflicting relations between the countries and coalitions involved in the negotiations. We dichotomized the networks so that they reflect only the main actors. Consequently, we only show ties for those country pairs that interacted cooperatively at least 50 times or in a conflictual manner at least 15 times, respectively, in all negotiations between 1995 and 2013.[11] These simplified networks correlate very strongly with the original, non-dichotomized versions (correlation coefficients of 0.78 in both cases), supporting the assumption that they closely represent the prevailing patterns of cooperation and conflict in the overall negotiation network.

Figure 2 shows the network of cooperative ties and Figure 3 the network of conflictual ties. Annex I members are depicted in light grey triangles, while non-Annex I members are in dark grey circles. The size of the nodes reflects the countries' indegree or popularity level.

The network of cooperative ties (Figure 2) shows a clear separation between most Annex I and non-Annex I countries. Cooperative ties exist mostly among Annex I or non-Annex I countries, with only a few intergroup ties. From Annex I, only the European Union and the United States act as brokers and interact cooperatively with key members of the non-Annex I group – the G77/China and AOSIS (a coalition representing small island developing states). In contrast, the network of conflictual ties (Figure 3) shows that conflict arises most frequently across the divide. Both graphs support the group effect hypothesis: Members of the same group tend to cooperate more with each other, while members of different groups tend to engage in more conflictual negotiation interactions.

[10] The dyadic-level variables were set to zero for the coalitions. Exceptions are *aid flows* from the EU, where we have data for the EU as a donor itself; and *same region* for coalitions with a regional coverage such as the African Group.
[11] Note that there were about five times as many cooperative negotiation interactions as conflictual ones, so it makes sense that the threshold is lower for conflictual interactions. The choice of threshold was based on correlation with the original non-dichotomized networks, readability of the graphs, and including the main negotiation players.

Figure 2: Network of cooperative negotiation events (main actors)[12]

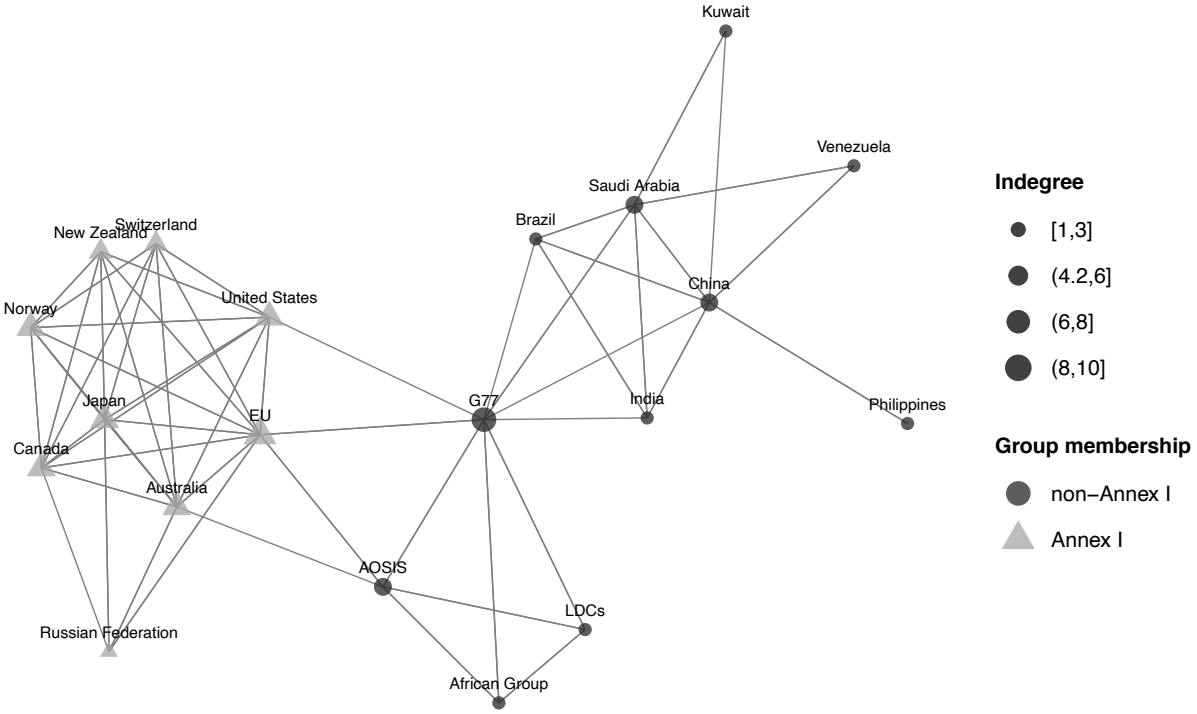
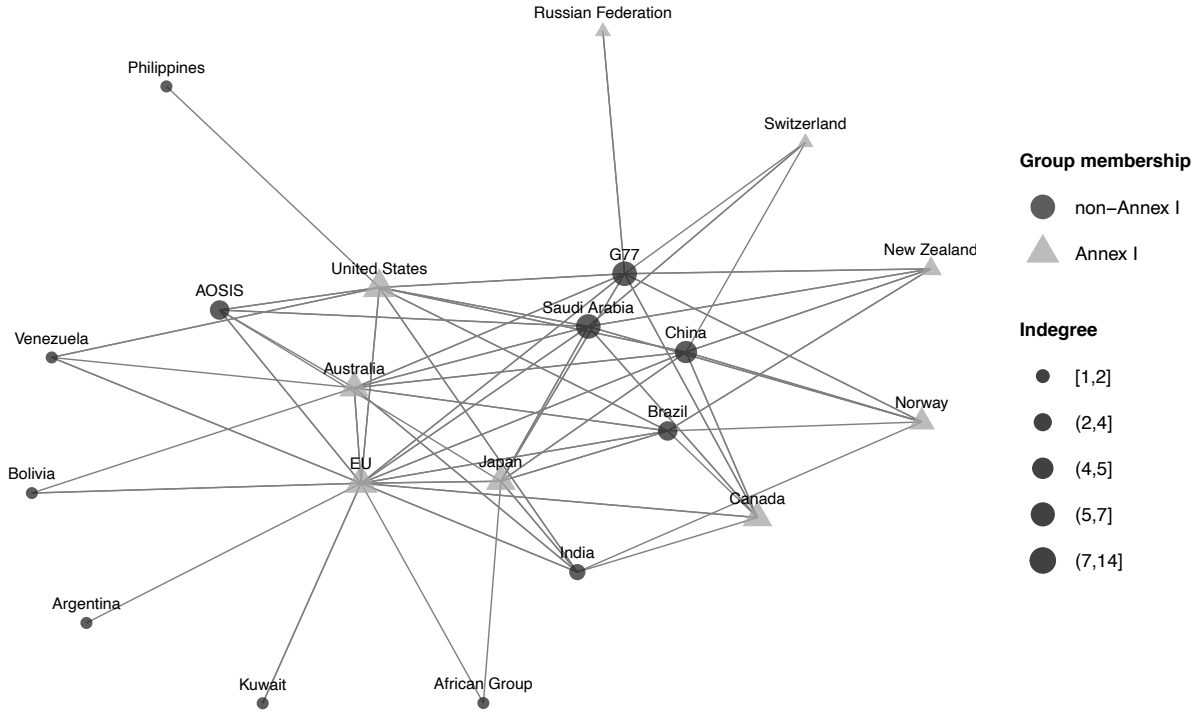


Figure 3: Network of conflictual negotiation events (main actors)[13]



[12] A tie means that two actors cooperated at least 50 times in all negotiations from 1995-2013.
[13] A tie means that two actors had at least 15 conflictual interactions in all negotiations from 1995-2013.

Results from the type model: Group and incentives effects

Table 1 and Figure 4 present the results from the type regressions, which model the likelihood that two countries' interactions in the negotiations are cooperative rather than conflictual. We used the *rem* package implemented in R (Brandenberger 2017) to estimate the set of network statistics described above and ran the regressions using standard logit and linear probability models. The table shows four different models with slightly different specifications. In all models, the variable *group membership* is used to test Hypothesis 1. The variable is set up so that its base category indicates that both countries in the dyad are members of different annexes, and the two categories shown in Table 1 indicate joint membership in Annex I or in non-Annex I. All parameter estimates are presented as coefficients with standard errors in parentheses.

Models 1 and 2 apply logit regressions to model our binary dependent variable indicating whether a negotiation interaction is cooperative or conflictual. Models 3 and 4, in contrast, use OLS regression as alternative specifications that will be needed for the sensitivity analysis of omitted variable bias (see supplementary information). Further, models 2 and 4 include all network statistics and control variables that we identified as being relevant in the preliminary analysis. In models 1 and 3 all network statistics are omitted, but we added two controls for how active countries are in the negotiations: *interventions sender* and *interventions target*. All models include year fixed effects to account for shocks that might have happened in particular years. As indicated by the AIC and BIC, the fit is best for the models that include network statistics. The effects of our main independent variables are robust across all models, as shown by Figure 4 and Figure A9 in the supplementary information; however, the strength of some effects is lower in the models that include network statistics. This supports our assumption that past negotiation behavior and network structures partly explain cooperative behavior in current negotiations.

Our main results are more clearly visible in Figure 4. Panel (a) shows the interaction effect between *group membership* and *mitigation* for the logit regression without network statistics (Model 1), while panel (b) shows it for the logit regression with network statistics (Model 2).[14] Clearly, in both graphs, countries in the same Annex interact substantially more cooperatively with each other than countries in different annexes. The effect is sizable; depending on the group and the topic of discussion, the predicted probability of cooperation increases by seven to 27 per cent for members of the same Annex. This finding strongly supports Hypothesis 1 concerning the peer group effect. On average, the peer group effect is larger for non-Annex I countries than for Annex I countries. It would seem that despite their greater heterogeneity, non-Annex I countries tend to act more cooperatively within their group than Annex I countries. We discuss potential explanations for this finding in the discussion section below. Interestingly, in Model 2 with network statistics, differences between the groups are less pronounced. This confirms our expectation that including the network statistics makes the test of our hypotheses harder.

[14] Graphs for Models 3 and 4 are shown in Figure A9 in the supplementary information and yielded very similar patterns. We also estimated the interaction plots for Model 2 with different values of some key control variables. Figure A10 in the supplementary information shows interaction plots setting the year dummy to various different years, and assuming that pairs of countries are in the same coalition and same region. The findings on the group and the incentives effect remain robust, even though cooperation is on average higher for countries in the same coalition.

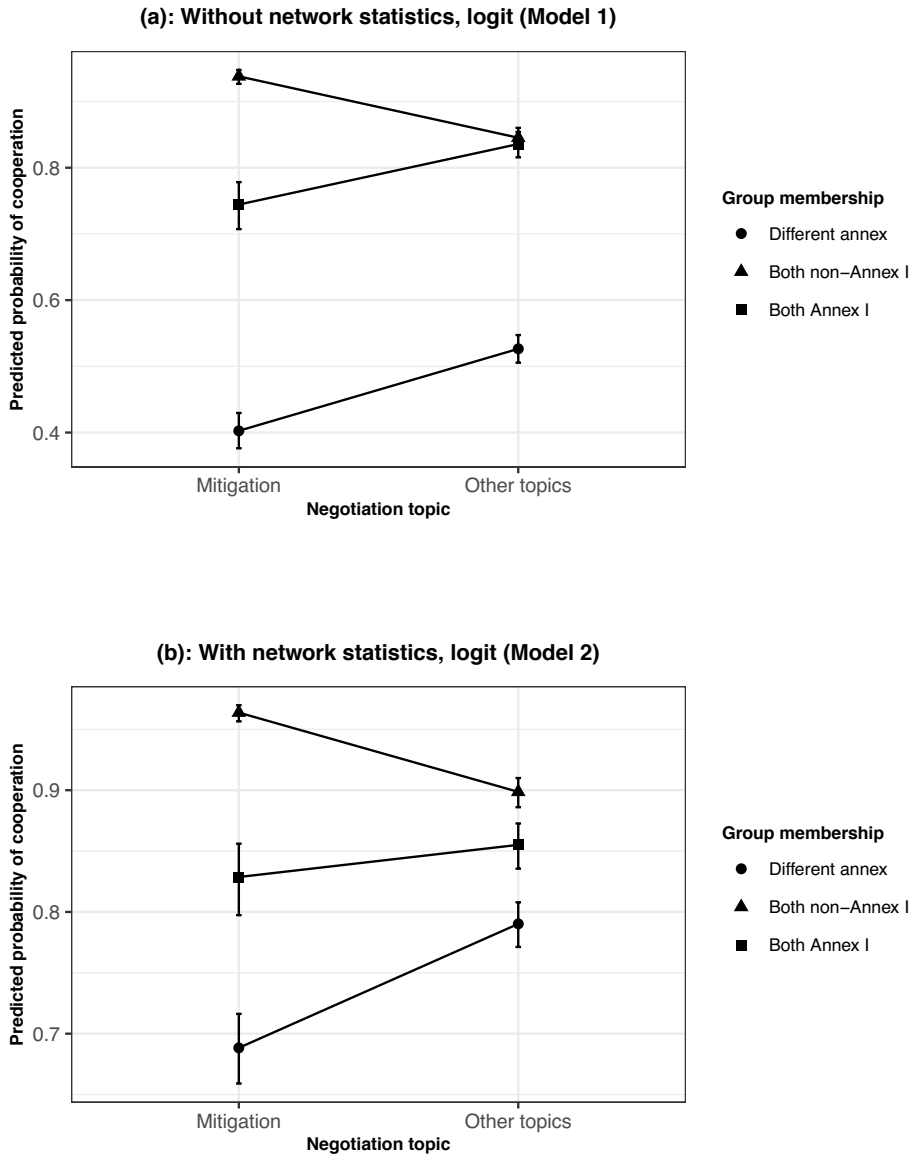
Table 1: Results from the type model: Likelihood that negotiation interaction is cooperative

	Model 1 *Logit*	*Model 2* *Logit*	*Model 3* *OLS*	*Model 4* *OLS*
Main independent variables and interactions				
Group membership (different Annex is the baseline category)				
Both non-Annex I	1.592 (0.053)***	0.856 (0.057)***	0.298 (0.006)***	0.193 (0.006)***
Both Annex I	1.521 (0.063)***	0.449 (0.069)***	0.292 (0.006)***	0.160 (0.007)***
Mitigation	-0.500 (0.048)***	-0.533 (0.051)***	-0.097 (0.007)***	-0.104 (0.007)***
Both non-Annex I * Mitigation	1.519 (0.091)***	1.631 (0.093)***	0.134 (0.009)***	0.140 (0.008)***
Both Annex I * Mitigation	-0.058 (0.099)	0.335 (0.107)**	0.049 (0.011)***	0.072 (0.011)***
Network statistics				
Sender outdegree		-0.561 (0.146)***		-0.096 (0.015)***
Target indegree		0.520 (0.140)***		0.013 (0.015)
Reciprocity		185.950 (4.690)***		7.061 (0.209)***
Triad friend of friends		-0.221 (1.041)		-0.094 (0.091)
Triad friend of enemies		-26.912 (1.293)***		-3.126 (0.139)***
Triad enemy of enemies		0.078 (2.931)		3.305 (0.251)***
Triad enemy of friends		-22.084 (1.299)***		-3.018 (0.142)***
Sender similarity		7.510 (1.000)***		0.453 (0.090)***
Target similarity		8.870 (1.165)***		0.555 (0.106)***
Control variables				
Population sender (log)	0.009 (0.008)	0.008 (0.008)	0.002 (0.001)**	0.003 (0.001)***
Population target (log)	-0.054 (0.008)***	-0.057 (0.009)***	-0.005 (0.001)***	-0.004 (0.001)***
Income sender (log)	-0.089 (0.041)*	-0.104 (0.041)*	-0.006 (0.004)	-0.004 (0.004)
Income target (log)	-0.126 (0.042)**	-0.094 (0.042)*	-0.010 (0.004)*	-0.002 (0.004)
CO_2 per capita sender (log)	-0.106 (0.028)***	-0.077 (0.028)**	-0.008 (0.003)**	-0.011 (0.003)***
CO_2 per capita target (log)	-0.193 (0.030)***	-0.179 (0.030)***	-0.013 (0.003)***	-0.018 (0.003)***
Democracy sender	0.064 (0.007)***	0.048 (0.008)***	0.007 (0.001)***	0.006 (0.001)***
Democracy target	0.018 (0.008)*	0.002 (0.008)	0.002 (0.001)*	0.001 (0.001)
ND-Gain index sender	0.009 (0.003)**	0.009 (0.003)**	0.001 (0.000)***	0.002 (0.000)***
ND-Gain index target	0.014 (0.003)***	0.009 (0.003)**	0.001 (0.000)***	0.001 (0.000)***
Forest area sender	-0.004 (0.001)***	-0.003 (0.001)**	-0.000 (0.000)**	-0.000 (0.000)
Forest area target	-0.005 (0.001)***	-0.004 (0.001)***	-0.000 (0.000)***	-0.000 (0.000)*
Fossil rents sender	-0.012 (0.002)***	-0.007 (0.002)**	-0.001 (0.000)***	-0.000 (0.000)
Fossil rents target	-0.015 (0.002)***	-0.013 (0.003)***	-0.001 (0.000)***	-0.001 (0.000)***
Trade flows (log)	0.001 (0.002)	0.005 (0.002)**	0.000 (0.000)	-0.000 (0.000)*
Aid flows (log)	-0.016 (0.002)***	-0.004 (0.002)	-0.001 (0.000)*	-0.000 (0.000)
Same region	0.318 (0.039)***	0.269 (0.040)***	0.013 (0.003)***	0.013 (0.003)***
Same coalition	1.640 (0.059)***	1.091 (0.061)***	0.078 (0.004)***	0.044 (0.004)***
Coalition member	1.184 (0.107)***	1.269 (0.110)***	0.085 (0.008)***	0.077 (0.008)***
English sender	-0.297 (0.035)***	-0.242 (0.035)***	-0.025 (0.004)***	-0.024 (0.003)***

	Model 1	*Model 2*	*Model 3*	*Model 4*
	Logit	*Logit*	*OLS*	*OLS*
English target	-0.203 (0.035)***	-0.108 (0.036)**	-0.016 (0.004)***	-0.011 (0.003)**
Interventions sender	-0.001 (0.000)**		-0.000 (0.000)***	
Interventions target	0.001 (0.000)**		0.000 (0.000)	
Observations	58461	58461	58461	58461
Year fixed effects	YES	YES	YES	YES
AIC	38982	35244	34886	31443
BIC	39404	35729	35317	31937
Log likelihood	-19444	-17568	-17395	-15667
Adjusted R^2			0.224	0.268

Intercepts not shown. Standard errors in parentheses. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

Figure 4: Interaction plot: Group membership versus negotiation topic



Regarding our test for Hypothesis 2 about the creation of new incentives, we observe that non-Annex I countries tend to cooperate more when discussing issues related to mitigation, this is, to the costly obligations affected by the differential treatment. In addition, countries not in the same Annex tend to behave in a more conflictual way when discussing mitigation. In contrast, we note that once we control for network statistics, pairs of Annex I countries do not behave differently (in a statistically significant way) when they are discussing mitigation rather than other topics. These results suggest that the causal mechanism of creating new incentives is supported for pairs of non-Annex I countries and pairs of countries in different annexes, but not for pairs of Annex I countries. Therefore, it seems that the incentives are stronger for the group of non-Annex I countries that enjoy the privilege of not having emission reduction obligations but of receiving financial and technical support.

In summary, the regressions strongly support the group effect hypothesis and the idea that this effect is caused, at least in the case of the non-Annex I countries, by the new incentives created through the institutionalization of groups enjoying differential treatment. The estimates on the control variables and network statistics largely correspond to expectations, which supports our confidence that the models have been operationalized correctly.

Results from the rate model: Group socialization effect

The rate model allows us to assess how the climate negotiations network has evolved over time. This is useful for testing our third hypothesis on group socialization, which argues that the group effect should become steadily stronger over time as the countries within each group develop a mutual understanding of the negotiations, common positions, trust, and a shared identity.

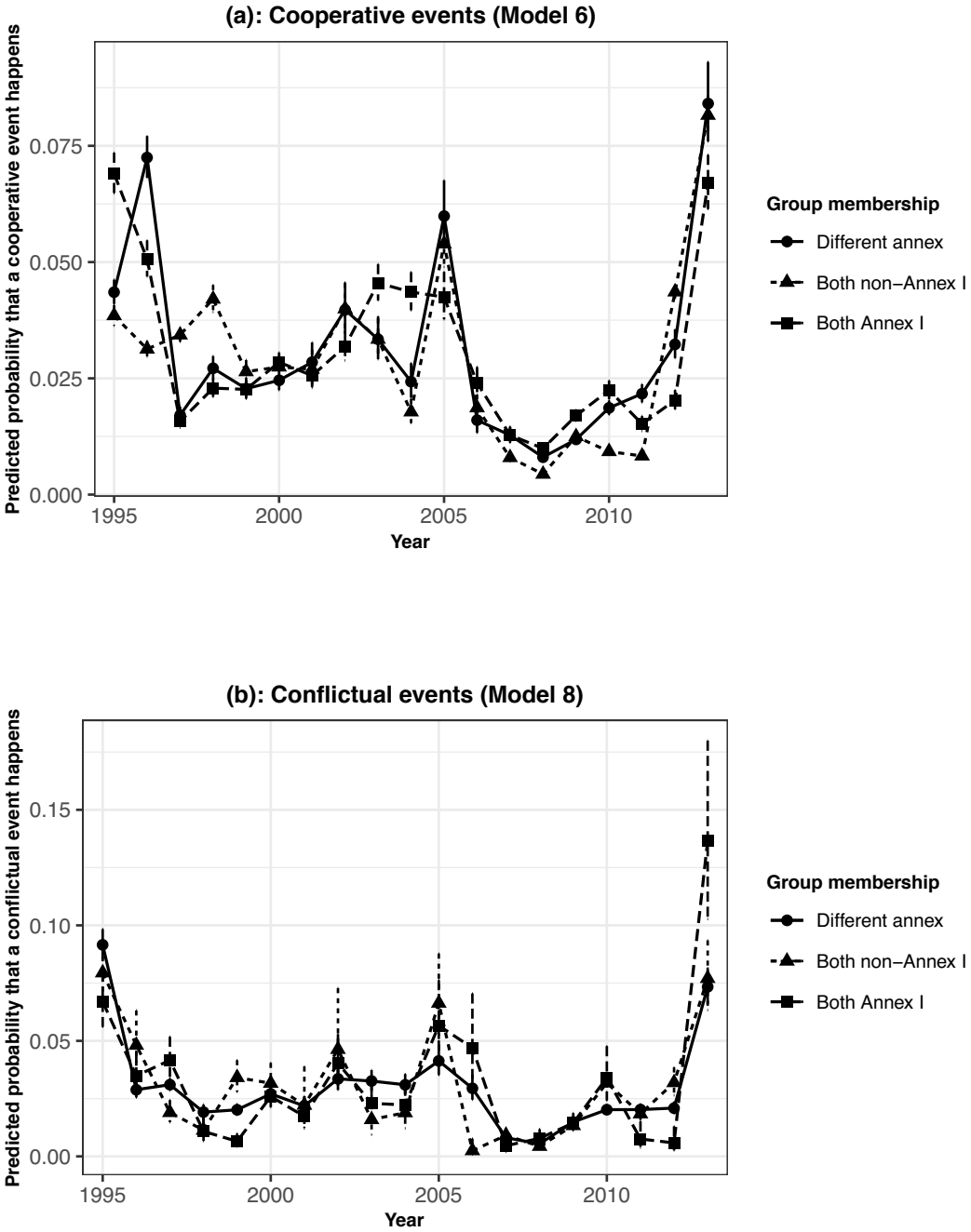
We set up the rate model in a way consistent with the type model, including the same set of covariates, and in versions with and without network statistics. As explained above, we have tested this hypothesis by looking at subsets of cooperative-only or conflictual-only interactions among our dyads. We expect our main explanatory variable, *group membership*, to show a positive and significant effect of being in the same Annex on the frequency of the cooperative negotiation interactions and a negative and significant effect on the frequency of the conflictual interactions. In addition, we expect that the *interaction* between group membership and the year of negotiations will affect the frequency of cooperative and conflictual negotiation interactions. More specifically, we would expect an increasing number of cooperative negotiation interactions over time among members of the same group, decreasing amounts of cooperative interactions among dyads from different groups, and the opposite effect for conflictual interactions.

Figure 5 presents the corresponding results. Panel (a) shows the results of regressions on the cooperative negotiation interactions, while panel (b) shows those on the conflictual interactions, focusing on the interaction effects (Both non-Annex I * Year dummies, Both Annex I * Year dummies and Different Annexes * Year dummies).[15] Keeping all other country and dyad-specific characteristics constant and controlling for structural network characteristics, the graphs show no systematic effects of group membership on cooperative or conflictual negotiation interactions over time. There is neither a temporal pattern nor a systematic difference between dyads of countries in the same Annex or countries in different annexes. Crucially, the frequency of cooperative behavior does not seem to increase over time, as would be

[15] Table A9 in the supplementary information displays the results for these regressions including the control variables.

expected under a slow process of trust-building and the establishment of a group identity. Consequently, these results fail to support our hypothesis that the previously verified group effect is related to socialization within each group.

Figure 5: Effect of group membership on negotiation event frequency over time



Instead, the frequency of cooperation and of conflict seems to evolve with the specific particularities of the negotiation process over time. The peaks in the curves generally reflect years with intense negotiation activity, such as 2005, when

the Kyoto Protocol entered into force, or 2009-2010, when the Copenhagen Accord and the Cancun Agreements were negotiated. They also reflect the emergence of new country coalitions, which leads to increased cooperative negotiation events in the post-Copenhagen period (Blaxekjær and Nielsen 2014). Also, the lack of a pattern of strengthening group identity and socialization over time might be related to the increasing heterogeneity within the groups, particularly the non-Annex I group (Vihma et al. 2011). While some non-Annex I countries have become wealthier and more polluting over time, as they have developed and adopted more energy-intensive economies and lifestyles, others have remained poor and vulnerable to climate change. These increasing differences in national circumstances within the groups are a possible explanation for why the hypothesized group socialization has not taken place.

Robustness tests

Section 4 of the supplementary information details the robustness tests that were performed on the type and rate models, including a sensitivity analysis to omitted variable bias and an alternative, more descriptive test of the socialization hypothesis. They all support our main findings.

Discussion

Our analysis provides clear evidence for the constructed peer group hypothesis. Countries that belong to the same Annex are substantially more likely to cooperate with one another than countries belonging to different annexes. This effect remains significant and substantive even when considering countries' intrinsic similarities, bilateral ties, or typical negotiation behavior.

Furthermore, we expected that material incentives associated with the differential treatment of the two groups regarding mitigation commitments would be one driver of cooperation behavior. Specifically, we expected intragroup cooperation to be more likely when mitigation was the topic of discussion. Interestingly, our findings have shown different outcomes for the two groups. In line with our expectations, we found that in the non-Annex I group, which is the net beneficiary of privileges, cooperation is more likely when discussions concern mitigation. Hence, advocating a common position towards mitigation-related topics seems to bind the otherwise very heterogeneous non-Annex I group. Our findings were different for the Annex I group, which is subject to obligations. We have clear evidence that Annex I countries tend to cooperate more among themselves than with non-Annex I countries, but mitigation topics are not the main incentive for this cooperation.

What, then, drives in-group cooperation among the Annex I countries? Annex I countries are more homogeneous than non-Annex I countries with respect to several structural characteristics, including CO_2 emissions, democracy, vulnerability, forest area, and fossil fuel rents (see Figures A2 to A8 in the supplementary information). Furthermore, they have well-established diplomatic ties owing to a long history of joint membership in IGOs such as the OECD. These ties are partly captured by some of our network statistics. As Figures A14 and A15 in the supplementary information show, reciprocity and transitivity are substantially higher among Annex I countries than among non-Annex I or across the two groups. In line with earlier research on the role of interests, political institutions, or IGO memberships (e.g., Sprinz and Vaahtoranta 1994; Bättig and Bernauer 2009; Hafner-Burton and Montgomery 2006),

we argue that shared interests and well-established diplomatic relations increase the likelihood that Annex I countries will cooperate over a wide range of negotiation topics.

At the same time, our results show that Annex I countries generally cooperate less with each other than non-Annex I countries, despite having more in common, but that this difference is particularly pronounced when the topic is mitigation. This is probably because Annex I countries have historically been divided about mitigation into a subgroup of proactive countries led by the European Union, which favored legally-binding reduction targets, and a subgroup of countries, led by the United States, who sought to abolish these obligations or to extend them to major polluters from the global South (Dimitrov 2016). Mitigation is clearly not the uniting topic for the Annex I group. In sum, our results suggest that under a regime of differential treatment, maintaining privileges constitutes a stronger incentive to cooperate than abolishing (or extending) obligations, despite the greater heterogeneity of the non-Annex I group.

We did not find support for the idea that the group effect is related to a process of socialization over time. Instead, it seems that the evolution of cooperation, reciprocity and transitivity is linked to changes in the nature and salience of the negotiation process, and potentially also to the growing heterogeneity of the non-Annex I group, in particular.

A potential explanation for why socialization does not seem to drive the group effect may be that some of the scope conditions for the emergence of international socialization, as proposed by Checkel (2005), do not exist in the climate negotiations. Checkel argues, first, that internalizing new roles in line with group norms (type I socialization) requires settings where contact is long, sustained, intense, and conditional on agents with more extensive experience in international policymaking rather than with deep domestic-level ties. Second, persuasion (type II socialization) is more likely to take place, among other things, in settings that are less politicized and more insulated from external influence. In the climate negotiations, while delegates have engaged in long-term, sustained, and intense exchanges, the process is not at all insulated from external influence and the topic is also highly politicized. The media reports frequently on the negotiations, informative summaries are published regularly, and NGOs and lobby groups have access to the negotiations both as observers and in national delegations (Betzold 2013; Betzold et al. 2016).

Conclusion

Even though differential treatment was initially meant to facilitate cooperation by establishing a more level playing field in a world where nations have vastly differing domestic circumstances, for over 20 years, differential treatment has contributed to stasis in the climate change negotiations by institutionalizing a rigid cleavage between two groups of countries with differentiated rights and obligations.

This article has theorized and empirically tested the causal mechanisms that lead from differential treatment to a lack of cooperation in the climate change regime. We have drawn on rationalistic and constructivist accounts of socialization in IGOs to argue that the creation of country groups with differential treatment may affect negotiation behavior within an IGO. First, differential treatment implies that some groups are associated with more costly obligations while others are associated with privileges. Consequently, the creation of groups will lead to new material incentives. Therefore, we expected group members subject to obligations to cooperate in fighting the status quo and groups members subject to

privileges to seek to maintain it. Second, as the groups engage in discussions and conform to recognized labels and categories, over time, their members develop a common understanding, trust, and a group identity, leading to more cooperative intragroup behavior.

In the climate change regime, the UNFCCC defined the Annex I group of countries with emission reduction obligations and the non-Annex I group of countries with privileges (without any mitigation commitments). Our findings support the constructed peer group hypothesis, namely that the cleavage between Annex I and non-Annex I countries has indeed influenced negotiation behavior in the UNFCCC. It is interesting to note that the effect plays out differently for the two groups. In particular, non-Annex I group privileges created a uniting factor that increased the likelihood for intragroup cooperation, despite stark political, economic, and geographical differences between member countries. While mitigation seems not to be the primary driver for cooperation between Annex I countries, we still observe this group's tendency to cooperate among its members on a more general level.

Over time, this peer group effect may historically have amplified the divide between developing and industrialized countries and contributed to the prolonged stalemate that has prevented progress in addressing climate change. Arguably, the deliberate creation of differentiated country groups in the institutional design of the Climate Convention produced unintended negative consequences for the development of the negotiations within the organization and for the effectiveness of the regime.

These results imply that, in the future, greater attention to institutional design could help IGOs achieve their goals. If initial differentiation is necessary to achieve an agreement in the first place, this differentiation should be institutionalized in a way that minimizes the incentive to maintain the status quo. More successful examples of global cooperation on environmental issues, such as the Montreal Protocol, suggest that differentiation based on clear criteria and transparent graduation rules is preferable to rigid country lists. Differential treatment needs to work within a controlled framework where it does not obstruct the treaty's general purpose but responds to real differences between countries and then ceases to exist when those differences no longer exist (Rajamani 2006).

Finally, we acknowledge that the most recent developments in the climate change regime have not been taken into account in our research since we only investigated the pre-Paris period. Methodologically, examining this period separately was the correct way to proceed. The adoption of the Paris Agreement led to the abolition of the institutionalized divide between Annex I and non-Annex I countries. The conceptualization of differential treatment as a rigid barrier between two groups has been replaced by a more granular differentiation of self-determined contributions from all countries (Maljean-Dubois 2016). We expect this groundbreaking institutional change to be an essential step towards overcoming stasis and achieving more cooperation on addressing climate change, even across the former cleavage. Future empirical work may seek to assess whether this expectation is fulfilled.

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The institutionalization of a cleavage: How differential treatment affects state behavior in the climate negotiations

Supplementary appendix for online publication

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Contents

1. Codebook for relational data between parties to the UN Framework Convention on Climate Change

1.1 General dataset description

This dataset is based on hand-coding of summaries of the negotiations under the UN Framework Convention on Climate Change (UNFCCC). It covers all meetings of the official UNFCCC bodies reported in the Earth Negotiation Bulletins (ENBs) between February 1995 and December 2013. The original ENBs can be downloaded from http://www.iisd.ca/vol12/.

The dataset contains relational data between parties to the UNFCCC, which has been obtained by coding whether parties to the UNFCCC react in a cooperative or conflictual manner to other parties' interventions as reported in the ENBs. The observations also contain information regarding the topic or issue area and the negotiation meeting in which the respective statement was made.

Note that the dataset not only includes countries, but also country coalitions – groups of countries that have come together voluntarily in order to increase their negotiating power by expressing joint positions. We treat these coalitions as individual actors who interact with all other countries and coalitions.

Four coders contributed to the data collection. In order to ensure that the coding was consistent, all coders started by coding the same sample of ENB issues, so that all had the same understanding of the coding rules. Intercoder reliability was tested using Cohen's kappa. Values ranged from 0.90 to 0.98 for the coding of cooperative versus conflictual interactions. This was deemed to indicate a substantial reliability.

The full dataset was created for the SNF-funded research project "Institutional design and 'constructed peer groups' in international organizations: The case of the international climate change regime" at the University of Zurich, between 2013 and 2015. It is publicly available in Harvard Dataverse (Castro 2017). Questions regarding the dataset should be directed to Paula Castro (paula.castro@zhaw.ch).

1.2 Variable description

Country 1: Country (or coalition) that says something on behalf of, agrees with, supports, delays the proposal of, opposes to or criticizes Country 2. For the purposes of this paper, Country 1 is the sender.

Interaction: The type of reaction of Country 1 to a statement/position by Country 2. In this paper, we use a binary classification into *cooperative* and *conflictual* interactions. Cooperative interactions include *agreement* (when several countries hold the same position on an issue), *support* (when the text indicates that one country supports another one) and *speaking on behalf of* (when one country speaks for a group of countries that is not an established coalition). Conflictual interactions include *delaying a proposal* (when a country asks that someone else's proposal be discussed at a later time), *opposition* (when two countries have opposing positions, or when one is reported to oppose the other one), and *criticism* (when one country explicitly criticizes another country's position or statement).

Country 2: Country (or coalition) whose position or statement is supported, agreed with, criticized, etc. Country 2 is thus the target in our analysis.

Conference: Place and year of meeting of the UNFCCC bodies.

Topic: Issue area to which the statements by Country 1 and Country 2 refer. In this paper we use following categories:

- *Mitigation:* Discussions related to emission reductions and who should take them up, including discussions on level of ambition for mitigation, and on several mitigation-related instruments.
- *Critical topic:* Includes discussions that more broadly relate to the differential treatment between developed and developing countries enshrined in the UNFCCC. Critical topic includes all discussions on *mitigation* described above, plus discussions about *principles of the Convention* (which frequently relate to the concept of common but differentiated responsibilities that underlies the regime's differential treatment), and discussions about the *content*

of new agreements (on the scope of a proposed new agreement to address climate change, or about amendments to an existing agreement).

- *Other topics:* All other topics, which are less strongly related to differential treatment, including measures to adapt to the impacts of climate change; the provision of finance, technology and capacity building to developing countries; emissions from international shipping and aviation; emissions and removals from forestry, land use, deforestation and land degradation; market-based mechanisms; the organization and agenda of the negotiations; institutional arrangements within the regime; reporting of emissions; measures to address the economic impact of climate policies; emissions from agriculture; and climate science.

Comment: Usually quotes the text that shows the coded interaction. May also include comments on the coding.

ENB Nr: Number of the Earth Negotiation Bulletin from which the interaction was coded.

Date: Calendar date in which the interaction took place.

ID_own: Observation ID, which consists of the ENB Number followed by an observation counter.

2. Descriptive statistics of cooperative and conflictual interactions in the negotiations

2.1 Table A1: Types of negotiation interactions

Type of interaction	No. of negotiation interactions	Percentage
Cooperative	**51928**	**83.62**
Agreement	41183	66.32
Support	2501	4.03
On behalf of	8244	13.28
Conflictual	**10169**	**16.38**
Delaying proposal	36	0.06
Opposition	9979	16.07
Criticism	154	0.25
Total	**62097**	**100.00**

2.2 Table A2 (a) and (b): Ten most active Annex I and non-Annex I countries

Annex I country (as sender)	No. of negotiation interactions
EU	3686
United States	2624
Australia	2541
Japan	2397
Canada	2163
New Zealand	1498
Norway	1416
Switzerland	1084
Russian Federation	763
Poland	228

Non-Annex I country (as sender)	No. of negotiation interactions
China	2262
Saudi Arabia	2214
India	1670
G77	1618
AOSIS	1470
Brazil	1424
Venezuela	1210
Bolivia	1008
Kuwait	1003
Argentina	973

2.3 Table A3 (a) and (b): Ten Annex I and non-Annex I countries with the most cooperative interactions

Annex I country (as sender)	No. of cooperative interactions
EU	2821
Australia	2054
United States	1996
Japan	1895
Canada	1792
Norway	1184
New Zealand	1173
Switzerland	885
Russian Federation	616
Poland	189

Non-Annex I country (as sender)	No. of cooperative interactions
China	1797
Saudi Arabia	1598
India	1431
AOSIS	1246
G77	1157
Brazil	1090
Venezuela	994
Argentina	852
Bolivia	844
Kuwait	808

2.4 Table A4 (a) and (b): Ten Annex I and non-Annex I countries with the most conflictual interactions

Annex I country (as sender)	No. of conflictual interactions
EU	865
United States	628
Japan	502
Australia	487
Canada	371
New Zealand	325
Norway	232
Switzerland	199
Russian Federation	147
United Kingdom	46

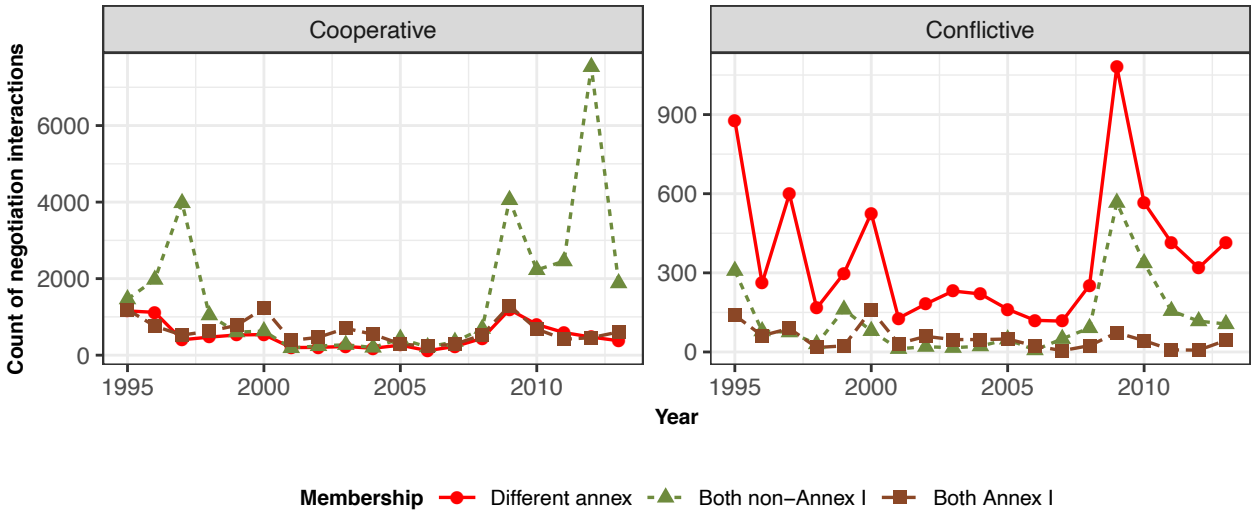
Non-Annex I country (as sender)	No. of conflictual interactions
Saudi Arabia	616
China	465
G77	461
Brazil	334
India	239
AOSIS	224
Venezuela	216
Kuwait	195
Bolivia	164
Tuvalu	145

2.5 Table A5: Most inactive UNFCCC member countries

UNFCCC party	No. of negotiation interactions
Albania, Andorra, Brunei Darussalam, Guinea, North Macedonia, Sao Tome and Principe, San Marino, St. Kitts and Nevis, Tonga	0*
-	1
Cyprus, Mongolia, Montenegro, Serbia	2
Armenia, Burundi, Madagascar, St. Vincent and the Grenadines	3
Lithuania, Turkmenistan	4
Liberia	5

*: Not in dataset

2.6 Figure A1: Count of cooperative and conflictual interactions over time, by group membership



3. Information on overall dataset

3.1 Table A6: Variable descriptions, sources and summary statistics

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max	Zeroes	Obs. without imputations	Sources
Main dependent and independent variables									
Cooperation	The interaction is cooperative (1) or conflictual (0)	62097	0.836	0.370	0.000	1.000	10169	62097	IISD 1995-2013, own coding
Group membership	Sender and target country are in the same annex (Annex I or non-Annex I) of the Convention (1), or not (0)	62097	0.735	0.441	0.000	1.000	16442	62097	UNFCCC website
Group membership, 3 categories	Sender and target country are in different annexes (0), together in non-Annex I (1), or together in Annex I (2)	62097	0.944	0.686	0.000	2.000	16442	62097	UNFCCC website
Mitigation	Topic of the interaction is mitigation (1) or not (0)	62097	0.200	0.400	0.000	1.000	49654	62097	IISD 1995-2013, own coding
Critical topic	Topic of the interaction is critical (mitigation, principles, new agreements) (1), or not (0)	62097	0.265	0.441	0.000	1.000	45651	62097	IISD 1995-2013, own coding
Network statistics									
Reciprocity	Tendency of actors to reciprocate past cooperative or conflictual negotiation behavior	62097	0.007	0.013	0.000	0.114	16378	62097	Own analysis
Sender outdegree	Past activity of current sender as sender	62097	0.205	0.189	0.000	1.079	2127	62097	Own analysis
Target indegree	Past popularity of current target as target	62097	0.210	0.193	0.000	1.115	2041	62097	Own analysis
Triad friend of friends	Tendency to form closing triads with the friend of a friend	62097	0.052	0.051	0.000	0.307	4422	62097	Own analysis
Triad enemy of enemies	Tendency to form closing triads with the enemy of an enemy	62097	0.013	0.014	0.000	0.099	8261	62097	Own analysis
Triad friend of enemies	Tendency to form closing triads with the friend of an enemy	62097	0.021	0.023	0.000	0.171	6866	62097	Own analysis
Triad enemy of friends	Tendency to form closing triads with the enemy of a friend	62097	0.021	0.023	0.000	0.179	6700	62097	Own analysis
Sender similarity	Similarity of current sender's targets with other senders' targets	62097	0.031	0.021	0.000	0.177	3705	62097	Own analysis
Target similarity	Similarity of current target's senders with other targets' senders	62097	0.034	0.019	0.000	0.125	2278	62097	Own analysis
Control variables									
Population sender	Total population of sender country (thousands). For the analysis this variable is logged.	62087	313935	855291	1.662	5565447	0	61972	World Bank 2016; UN DESA 2017
Population target	Total population of target country (thousands). For the analysis this variable is logged.	62093	360045	957406	1.662	5565447	0	61967	World Bank 2016; UN DESA 2017
Income sender	GDP per capita PPP of sender country (constant 2011 intl $). For the analysis this variable is logged.	62075	21956	19717	88	144715	0	61006	World Bank 2016; UN DESA 2017; UN Statistics 2018
Income target	GDP per capita PPP of target country (constant 2011 intl $). For the analysis this variable is logged.	62080	22077	19568	88	144715	0	61095	World Bank 2016; UN DESA 2017; UN Statistics 2018

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max	Zeroes	Obs. without imputations	Sources
CO_2 emissions per capita sender	Per capita CO_2 emissions of sender country (tCO_2). For the analysis this variable is logged.	62079	6.978	6.902	0.047	54.939	0	60734	Olivier et al. 2016; World Bank 2016; IEA 2017; Office of Environment, Principality of Liechtenstein 2017; UN DESA 2017; US EIA 2018
CO_2 emissions per capita target	Per capita CO_2 emissions of target country (tCO_2). For the analysis this variable is logged.	62087	7.000	6.787	0.047	54.939	0	60805	Olivier et al. 2016; World Bank 2016; IEA 2017; Office of Environment, Principality of Liechtenstein 2017; UN DESA 2017; US EIA 2018
Democracy sender	Level of democracy of sender country (Freedom House/imputed Polity)	62047	6.968	3.221	0.000	10.000	1565	61932	Freedom House 2018, obtained from Teorell et al. 2018
Democracy target	Level of democracy of target country (Freedom House/imputed Polity)	62076	7.024	3.187	0.000	10.000	1509	61950	Freedom House 2018, obtained from Teorell et al. 2018
ND-Gain index sender	ND-GAIN Country Index, summarizing the sender's climate vulnerability with its readiness to improve resilience.	60580	56.077	14.287	22.214	81.876	0	60580	Notre Dame Global Adaptation Initiative 2017
ND-Gain index target	ND-GAIN Country Index, summarizing the target's climate vulnerability with its readiness to improve resilience.	60605	56.310	14.296	22.214	81.876	0	60605	Notre Dame Global Adaptation Initiative 2017
Forest area sender	Forest area of sender country (% of land area).	62087	32.298	20.618	0.000	98.429	216	61921	World Bank 2016; FAO 2015
Forest area target	Forest area of target country (% of land area).	62093	32.426	20.301	0.000	98.429	192	61901	World Bank 2016; FAO 2015
Fossil rents sender	Rents from coal, oil and natural gas production in sender country (% of GDP).	61691	5.347	10.241	0.000	62.791	9672	56474	World Bank 2016; US EIA 2018; REEEP 2013; NREL 2016; Office of Statistics, Principality of Liechtenstein 2014; Ross and Mahdavi 2015, obtained from Teorell et al 2018
Fossil rents target	Rents from coal, oil and natural gas production in target country (% of GDP).	61703	5.211	10.101	0.000	62.791	9423	56688	World Bank 2016; US EIA 2018; REEEP 2013; NREL 2016; Office of Statistics, Principality of Liechtenstein 2014; Ross and Mahdavi 2015, obtained from Teorell et al. 2018
Trade flows	Total trade flows between sender and target (current British Pounds). For the analysis this variable is logged.	62097	3055140567	15232287211	0	281728450560	22742	43738	Fouquin and Hugot 2016; UN DESA 2016
Aid flows	Total aid flows between sender and target, including emerging donors (constant USD). For the analysis this variable is logged.	62097	29980275	224332947	0	11872586752	51345	62097	Tierney et al. 2011; AidData 2016; Strange et al. 2017
Same region	Sender and target are located in the same geographical region (dummy).	62097	0.248	0.432	0.000	1.000	46709	62097	Marshall et al. 1999, obtained from Teorell et al. 2018

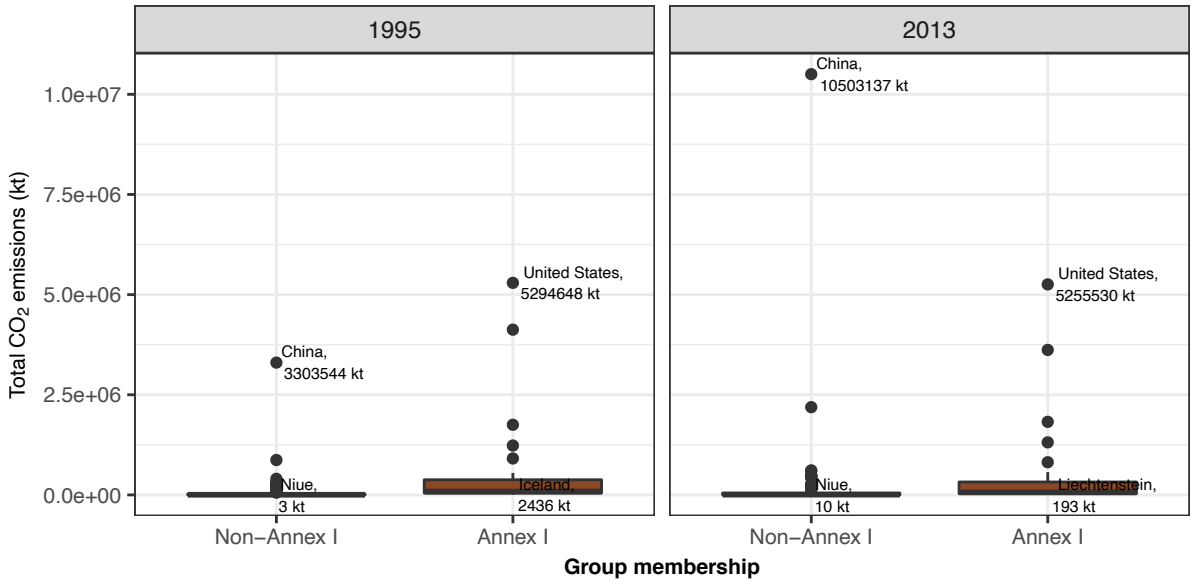
Variable	Description	Obs.	Mean	Std. Dev.	Min	Max	Zeroes	Obs. without imputations	Sources
Same coalition	Sender and target are members of the same negotiation coalition (dummy; excluding the G77 and China group).	62097	0.288	0.453	0.000	1.000	44214	62097	Own coding
Coalition member	Negotiation interaction is between a coalition and one of its members (dummy).	62097	0.039	0.194	0.000	1.000	59661	62097	Own coding
English sender	English is national or official language of sender country (dummy)	62096	0.360	0.453	0.000	1.000	33808	62096	Lewis 2009
English target	English is national or official language of target country (dummy)	62096	0.360	0.450	0.000	1.000	33261	62096	Lewis 2009
Interventions sender	Count of sender country's negotiation interventions in the current year	62093	52.990	68.800	0.000	407.000	563	62093	IISD 1995-2013, own coding
Interventions target	Count of target country's negotiation interventions in the current year	62093	54.444	69.563	0.000	407.000	567	62093	IISD 1995-2013, own coding
Additional variables used in robustness checks									
Total CO_2 emissions sender	Total CO_2 emissions of sender country ($ktCO_2$). For the analysis this variable is logged.	62088	732903	1760355	3	10503137	0	60840	Olivier et al. 2016; IEA 2017; Office of Environment, Principality of Liechtenstein 2017; US EIA 2018; World Bank 2016
Total CO_2 emissions target	Total CO_2 emissions of target country ($ktCO_2$). For the analysis this variable is logged.	62090	741826	1768511	3	10503137	0	60915	Olivier et al. 2016; IEA 2017; Office of Environment, Principality of Liechtenstein 2017; US EIA 2018; World Bank 2016
UN voting similarity	UN General Assembly voting similarity index (0-1). For the coalitions, its value was assumed to be 0.	60424	0.634	0.428	0.000	1.000	16921	60424	Voeten 2013
Same coalition (incl. G77)	Sender and target are members of the same climate negotiations coalition (dummy; including the G77 and China group).	62097	0.526	0.499	0.000	1.000	29441	62097	Own coding

3.2 Table A7: List of Annex I and non-Annex I parties to the UNFCCC

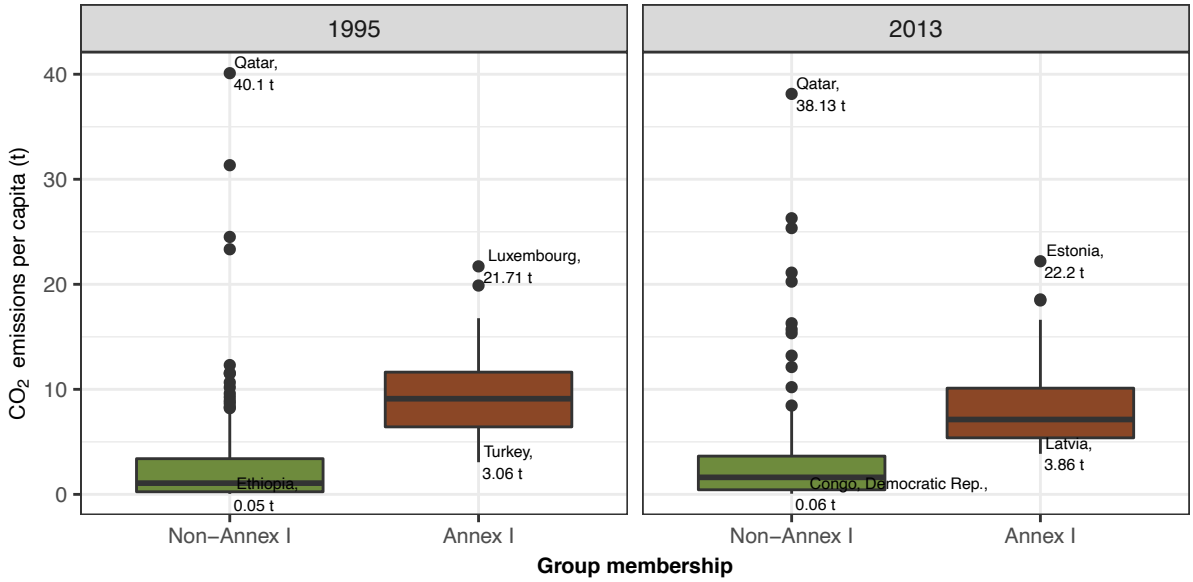
Annex I parties	Non-Annex I parties
Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, EU, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States	Afghanistan, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Democratic Rep., Congo, Republic, Cook Islands, Costa Rica, Cote d'Ivoire, Cuba, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Iran, Iraq, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Korea, Democratic Rep., Korea, Republic, Kuwait, Kyrgyz Republic, Lao PDR, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Nicaragua, Niger, Nigeria, Niue, Oman, Pakistan, Palau, Palestine, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Qatar, Rwanda, Samoa, Saudi Arabia, Senegal, Serbia, Serbia and Montenegro, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Sudan, Suriname, Swaziland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkmenistan, Tuvalu, Uganda, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Yemen, Yugoslavia, Zambia, Zimbabwe

3.3 Figure A2: Comparing country characteristics between groups and over time: Income

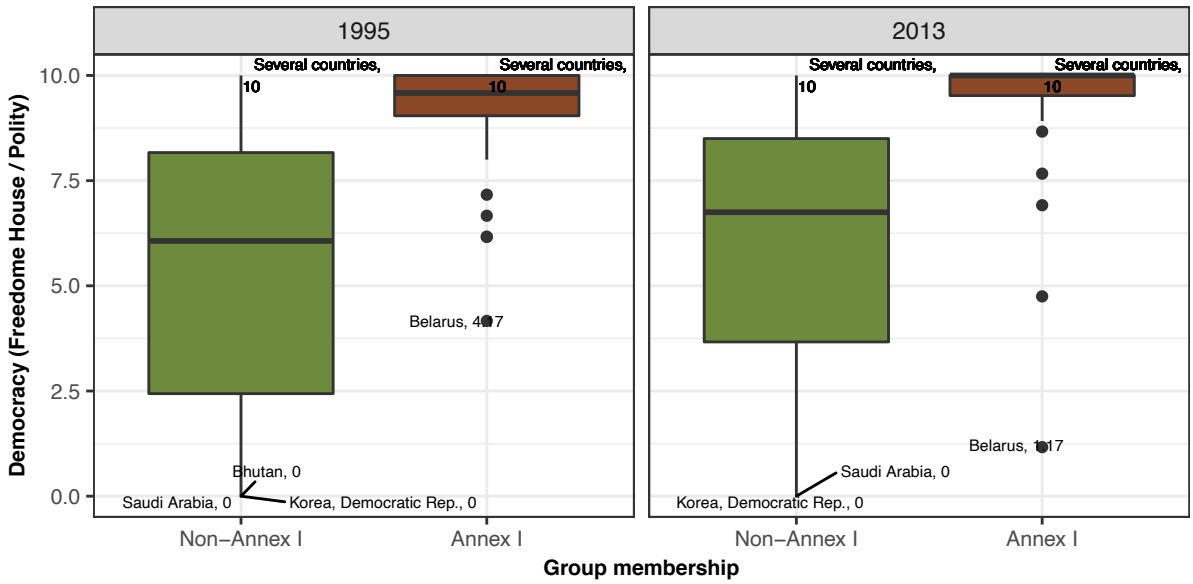
3.4 Figure A3: Comparing country characteristics between groups and over time: Total CO_2 emissions



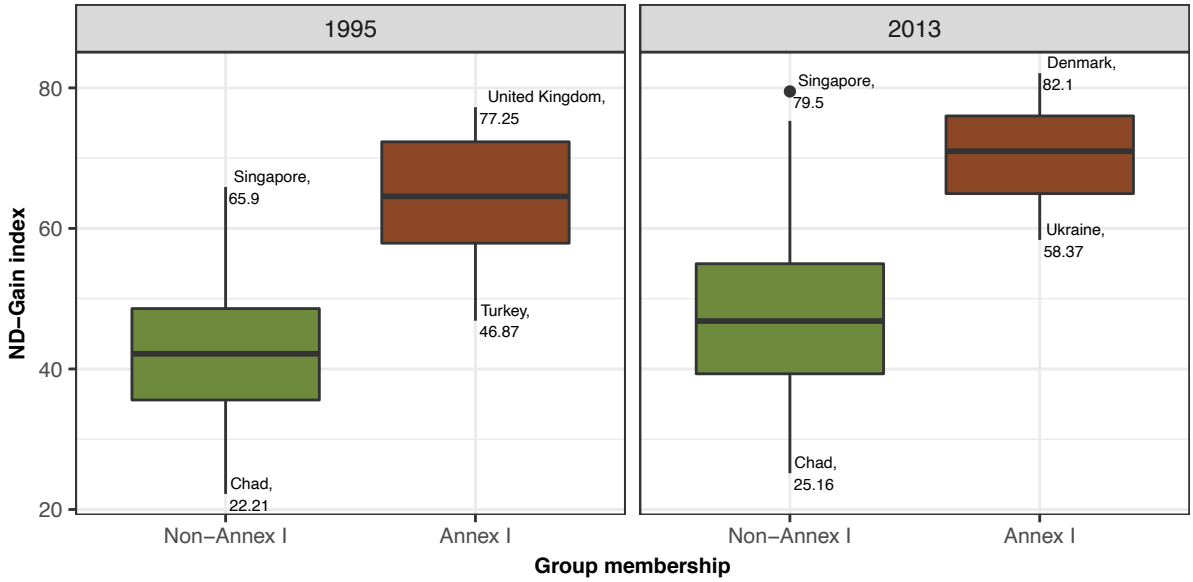
3.5 Figure A4: Comparing country characteristics between groups and over time: CO_2 emissions per capita



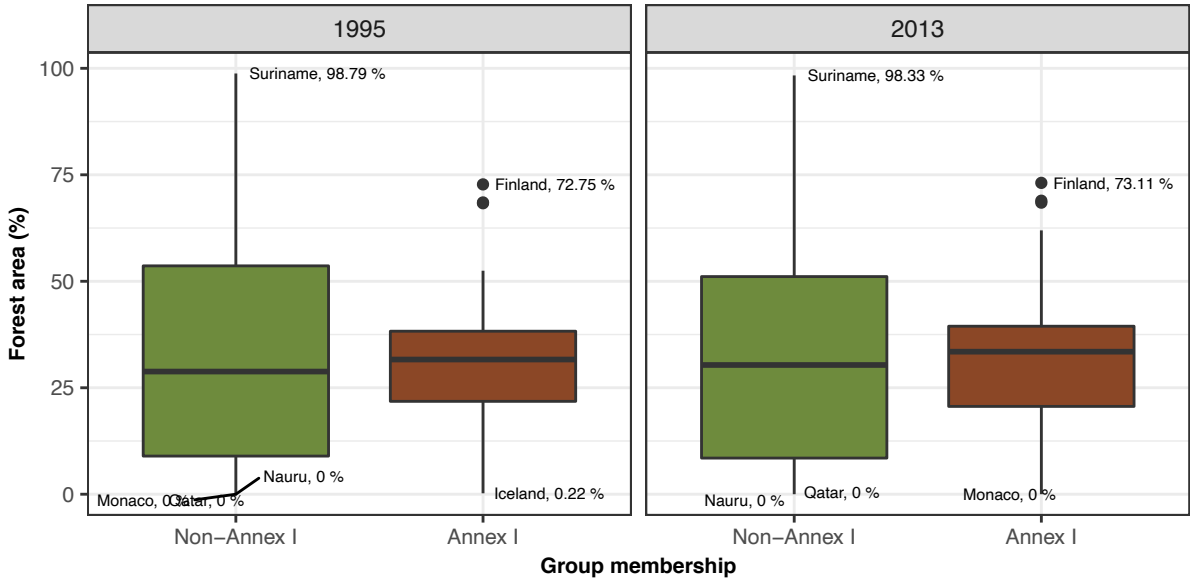
3.6 Figure A5: Comparing country characteristics between groups and over time: Democracy



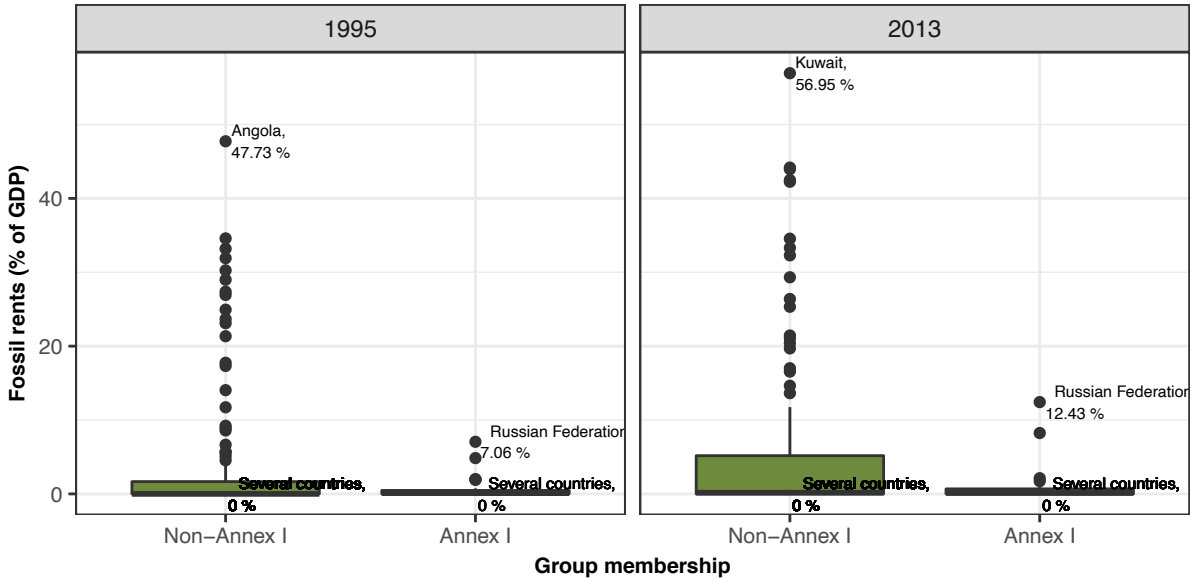
3.7 Figure A6: Comparing country characteristics between groups and over time: ND-Gain index



3.8 Figure A7: Comparing country characteristics between groups and over time: Forest area



3.9 Figure A8: Comparing country characteristics between groups and over time: Fossil fuel rents



4. Robustness tests and further statistical results

Several robustness checks were performed on the type and the rate models. In the type model, we first tested an alternative operationalization of our variable to evaluate the incentives hypothesis. The variable *critical topic* includes discussions on mitigation and those related to the principles of the Convention (which mostly cover discussions about the concept of common but differentiated responsibilities that underlies differential treatment in the regime), and discussions relating to what should be included in new agreements. Further regressions include alternative control variables, such as total CO_2 emissions instead of per capita emissions, voting similarity in the UN General Assembly, or an indicator of being in the same coalition that includes the G77. We also ran an alternative specification adding fixed effects for the negotiation meetings instead of years. Finally, we ran regressions in which we omitted all coalitions from the sample, omitted all data that had been imputed from other sources, or omitted the first two years of negotiations to avoid a biased estimation of the network statistics. For the rate model, we ran regressions using cubic polynomials and meeting fixed effects as alternative specifications for modeling the baseline hazard. We also ran regressions in which we omitted all coalitions from the sample and omitted all imputed data. These results are shown in Tables A8 and A10 as well as Figures A9 and A13 and show that our main findings are not affected by these changes.

In addition, Section 4.4 below shows that our results – both for the effect of being together in Annex I and being together in non-Annex I – are robust to quite a sizable potential omitted variable bias. This result improves our confidence that the choice of control variables was sufficient to identify the actual effect of shared Annex membership on negotiation behavior.

Finally, we added a further, more descriptive, empirical assessment of the socialization hypothesis by analyzing reciprocity and transitivity over time, which are often used as measures to proxy the development of social capital and socialization (e.g., Berardo and Scholz 2010). Figures A14 and A15 show how reciprocity and transitivity (measured as the closing of cooperative triads) evolve by group membership. If socialization had taken place within the peer groups, we would expect an increasing trend in reciprocity and transitivity within the groups over time, consistent with the development of shared attitudes and values, the build-up of cohesive subgroups, and the emergence of trust. At the same time, we would expect a decreasing trend between the two groups. The graphs show a slightly increasing reciprocity and transitivity trend over time, which seems to occur both within and between groups. Most prominently, they emphasize the ups and downs of the negotiation process in a similar way to what we observed in Figure A1. In sum, the evolution of reciprocity and transitivity in the climate negotiations network does not lend strong support for the hypothesis that socialization is an important mechanism driving the peer group effect.

4.1 Table A8: Robustness checks for the type model

	Logit regressions on cooperative versus conflictual interactions							
	Model A1	*Model A2*	*Model A3*	*Model A4*	*Model A5*	*Model A6*	*Model A7*	*Model A8*
	Critical topic	*Total CO_2*	*UN voting*	*Same coalition with G77 / China*	*Meeting fixed effects*	*No coalitions*	*No imputed / completed data*	*No first two years*
Main independent variables and interactions								
Both non-Annex I	0.800 (0.057)***	0.901 (0.057)***	0.841 (0.058)***	0.590 (0.062)***	0.882 (0.058)***	0.788 (0.069)***	0.888 (0.061)***	0.876 (0.063)***
Both Annex I	0.441 (0.069)***	0.494 (0.070)***	0.421 (0.071)***	0.622 (0.069)***	0.473 (0.071)***	0.446 (0.088)***	0.384 (0.072)***	0.428 (0.079)***
Critical topic	-0.439 (0.046)***							
Both no-Annex I * Critical topic	1.427 (0.081)***							
Both Annex I * Critical topic	0.332 (0.103)**							
Mitigation		-0.539 (0.051)***	-0.485 (0.052)***	-0.531 (0.051)***	-0.640 (0.053)***	-0.783 (0.063)***	-0.457 (0.053)***	-0.783 (0.062)***
Both no-Annex I * Mitigation		1.640 (0.093)***	1.584 (0.094)***	1.571 (0.093)***	1.734 (0.095)***	1.891 (0.109)***	1.533 (0.100)***	2.105 (0.114)***
Both Annex I * Mitigation		0.319 (0.107)**	0.251 (0.110)*	0.337 (0.106)**	0.434 (0.109)***	0.505 (0.133)***	0.263 (0.108)*	0.348 (0.127)**
Network statistics								
Sender outdegree	-0.550 (0.146)***	-0.590 (0.146)***	-0.557 (0.146)***	-0.754 (0.146)***	-0.653 (0.152)***	-0.595 (0.213)**	-0.562 (0.156)***	-0.614 (0.151)***
Target indegree	0.551 (0.141)***	0.448 (0.141)**	0.500 (0.141)***	0.338 (0.140)*	0.358 (0.148)*	0.333 (0.207)	0.488 (0.152)**	0.477 (0.147)**
Reciprocity	186.082 (4.689)***	183.654 (4.708)***	184.110 (4.702)***	191.270 (4.686)***	191.355 (4.775)***	314.438 (9.914)***	186.963 (4.723)***	188.483 (4.901)***
Triad friend of friends	-0.161 (1.042)	0.238 (1.042)	-0.079 (1.049)	1.880 (1.023)	0.162 (1.062)	-7.697 (1.611)***	0.106 (1.075)	1.665 (1.115)
Triad friend of enemies	-26.539 (1.293)***	-26.605 (1.305)***	-27.191 (1.296)***	-27.711 (1.294)***	-26.432 (1.308)***	-27.068 (2.125)***	-27.381 (1.342)***	-25.773 (1.351)***
Triad enemy of enemies	-0.789 (2.933)	-0.496 (2.936)	0.848 (2.946)	-1.189 (2.929)	-2.315 (2.991)	37.958 (5.041)***	-3.239 (3.020)	-6.272 (3.125)*
Triad enemy of friends	-21.889 (1.298)***	-22.394 (1.310)***	-22.133 (1.302)***	-22.605 (1.300)***	-22.080 (1.313)***	-32.888 (2.216)***	-22.124 (1.345)***	-22.849 (1.359)***
Sender similarity	7.309 (1.004)***	7.549 (1.004)***	7.293 (1.003)***	7.393 (0.999)***	5.093 (1.027)***	3.812 (1.332)**	8.145 (1.072)***	4.619 (1.056)***
Target similarity	8.658 (1.169)***	9.039 (1.167)***	8.992 (1.175)***	8.740 (1.164)***	5.510 (1.216)***	4.110 (1.497)**	10.003 (1.260)***	7.416 (1.266)***
Control variables								
Population sender (log)	0.007 (0.008)	0.053 (0.014)***	0.004 (0.009)	0.001 (0.008)	0.021 (0.009)*	-0.002 (0.014)	-0.004 (0.010)	0.016 (0.009)

	Logit regressions on cooperative versus conflictual interactions							
	Model A1	*Model A2*	*Model A3*	*Model A4*	*Model A5*	*Model A6*	*Model A7*	*Model A8*
	Critical topic	*Total CO_2*	*UN voting*	*Same coalition with G77 / China*	*Meeting fixed effects*	*No coalitions*	*No imputed / completed data*	*No first two years*
Population target (log)	-0.058 (0.009)***	-0.004 (0.014)	-0.059 (0.009)***	-0.065 (0.009)***	-0.039 (0.009)***	-0.048 (0.013)***	-0.062 (0.010)***	-0.027 (0.010)**
Income sender (log)	-0.103 (0.041)*	-0.141 (0.033)***	-0.118 (0.042)**	-0.096 (0.041)*	-0.087 (0.042)*	-0.159 (0.050)**	-0.232 (0.047)***	-0.115 (0.049)*
Income target (log)	-0.088 (0.042)*	-0.215 (0.035)***	-0.083 (0.044)	-0.071 (0.042)	-0.077 (0.043)	-0.054 (0.052)	-0.099 (0.048)*	-0.017 (0.050)
CO_2 per capita sender (log)	-0.083 (0.028)**		-0.073 (0.029)*	-0.073 (0.028)**	-0.083 (0.029)**	-0.093 (0.033)**	0.035 (0.032)	-0.084 (0.032)**
CO_2 per capita target (log)	-0.188 (0.030)***		-0.184 (0.030)***	-0.180 (0.029)***	-0.178 (0.030)***	-0.208 (0.034)***	-0.095 (0.033)**	-0.231 (0.034)***
Total CO_2 sender (log)		-0.065 (0.015)***						
Total CO_2 target (log)		-0.083 (0.015)***						
Democracy sender	0.047 (0.008)***	0.047 (0.008)***	0.051 (0.008)***	0.043 (0.008)***	0.048 (0.008)***	0.052 (0.009)***	0.056 (0.009)***	0.042 (0.009)***
Democracy target	-0.000 (0.008)	0.004 (0.008)	0.005 (0.008)	-0.005 (0.008)	0.003 (0.008)	-0.001 (0.009)	0.005 (0.009)	-0.020 (0.009)*
ND-Gain index sender	0.009 (0.003)**	0.010 (0.003)***	0.009 (0.003)**	0.008 (0.003)*	0.011 (0.003)***	0.014 (0.004)***	0.011 (0.003)***	0.013 (0.003)***
ND-Gain index target	0.009 (0.003)**	0.010 (0.003)**	0.009 (0.003)**	0.007 (0.003)*	0.009 (0.003)**	0.009 (0.004)*	0.006 (0.003)	0.008 (0.004)*
Forest area sender	-0.003 (0.001)**	-0.003 (0.001)**	-0.003 (0.001)***	-0.002 (0.001)**	-0.002 (0.001)**	-0.004 (0.001)***	-0.002 (0.001)*	-0.003 (0.001)**
Forest area target	-0.004 (0.001)***	-0.003 (0.001)***	-0.004 (0.001)***	-0.003 (0.001)***	-0.003 (0.001)***	-0.004 (0.001)***	-0.002 (0.001)**	-0.003 (0.001)**
Fossil rents sender	-0.007 (0.002)**	-0.006 (0.003)*	-0.006 (0.003)*	-0.005 (0.002)*	-0.006 (0.003)*	-0.007 (0.003)*	-0.003 (0.003)	-0.004 (0.003)
Fossil rents target	-0.013 (0.003)***	-0.012 (0.003)***	-0.012 (0.003)***	-0.011 (0.003)***	-0.011 (0.003)***	-0.012 (0.003)***	-0.014 (0.003)***	-0.010 (0.003)***
English sender	-0.241 (0.035)***	-0.249 (0.035)***	-0.259 (0.037)***	-0.215 (0.035)***	-0.217 (0.036)***	-0.297 (0.042)***	-0.256 (0.039)***	-0.168 (0.041)***
English target	-0.108 (0.036)**	-0.141 (0.036)***	-0.127 (0.038)***	-0.072 (0.036)*	-0.100 (0.037)**	-0.110 (0.043)*	-0.065 (0.040)	-0.019 (0.041)
Trade flows (log)	0.005 (0.002)**	0.015 (0.003)***	0.007 (0.003)*	0.004 (0.002)*	0.004 (0.002)*	0.015 (0.005)**	0.003 (0.002)	0.003 (0.002)
Aid flows (log)	-0.004 (0.002)	-0.001 (0.002)	-0.004 (0.002)	-0.002 (0.002)	-0.003 (0.002)	-0.004 (0.003)	-0.005 (0.002)*	0.002 (0.003)
Same region	0.277 (0.040)***	0.252 (0.040)***	0.248 (0.041)***	0.333 (0.040)***	0.268 (0.041)***	0.205 (0.045)***	0.317 (0.043)***	0.232 (0.045)***
UN voting similarity			-0.056 (0.075)					
Same coalition	1.095 (0.061)***	1.074 (0.061)***	1.103 (0.062)***		1.100 (0.062)***	0.943 (0.066)***	1.007 (0.065)***	1.139 (0.068)***
Same coalition (including G77)				0.474 (0.051)***				

	Logit regressions on cooperative versus conflictual interactions							
	Model A1	*Model A2*	*Model A3*	*Model A4*	*Model A5*	*Model A6*	*Model A7*	*Model A8*
	Critical topic	*Total CO_2*	*UN voting*	*Same coalition with G77 / China*	*Meeting fixed effects*	*No coalitions*	*No imputed / completed data*	*No first two years*
Coalition member	1.250 (0.110)***	1.197 (0.111)***	1.271 (0.111)***	1.428 (0.113)***	1.266 (0.111)***		1.373 (0.120)***	1.484 (0.134)***
Observations	58461	58461	57399	58461	58461	42123	50768	49572
Year fixed effects	YES	YES	YES	YES	NO	YES	YES	YES
Meeting fixed effects	NO	NO	NO	NO	YES	NO	NO	NO
AIC	35251.48	35249.06	34568.33	35526.3	34485.9	22914.03	31655.28	28202.98
BIC	35736.19	35733.77	35061.01	36011.01	35428.39	23372.39	32132.37	28661.16
Log Likelihood	-17571.74	-17570.53	-17229.17	-17709.15	-17137.95	-11404.02	-15773.64	-14049.49

Intercepts not shown. Standard errors in parentheses. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$. Explanation of regression models:

- Model A1: Controlling for a broader set of critical topics instead of mitigation.
- Model A2: Controlling for total CO_2 emissions instead of per capita CO_2 emissions.
- Model A3: Controlling for voting similarity at the UN General Assembly as an additional measure of political dyadic ties.
- Model A4: The control for membership to the same coalition now includes the Group of 77 and China, the largest coalition of developing countries.
- Model A5: Logistic regression, using fixed effects at the (weekly or two-weekly) meeting level.
- Model A6: All country coalitions are excluded from the sample.
- Model A7: The data does not include values imputed or completed from alternative data sources.
- Model A8: The first two years of data have been excluded to avoid a biased estimation of the network statistics.

4.2 Figure A9: Interaction plots of alternative specifications

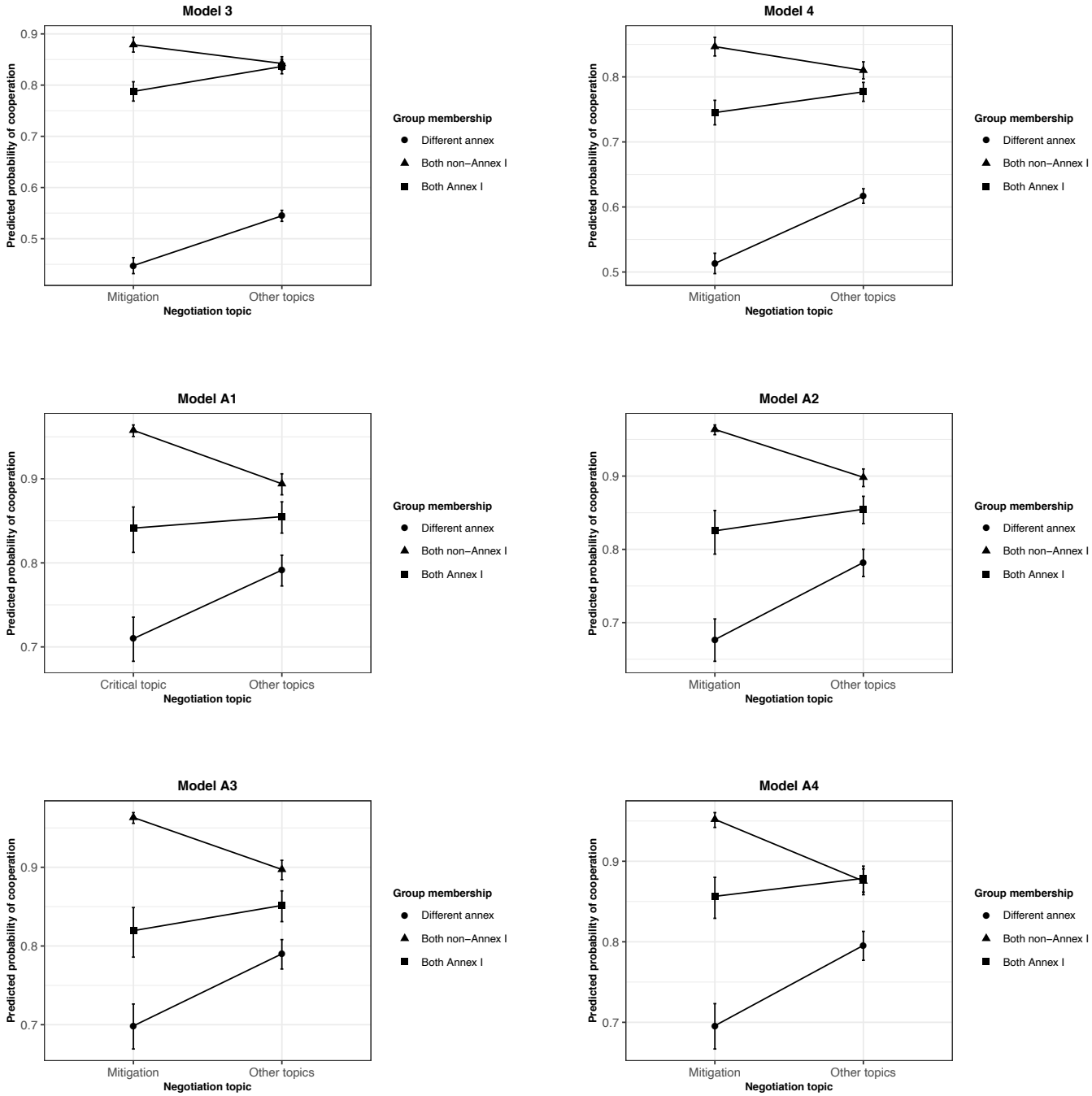
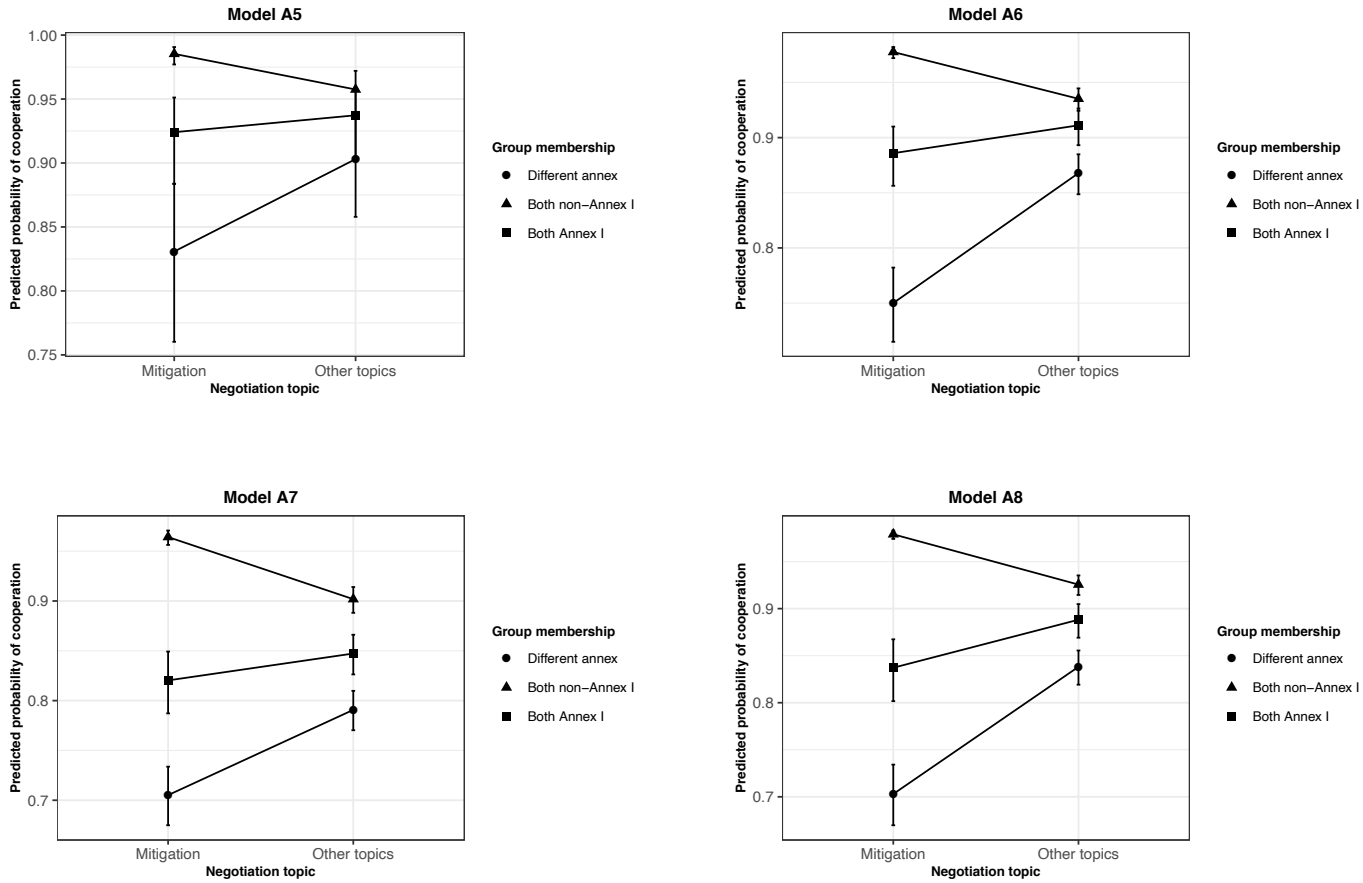
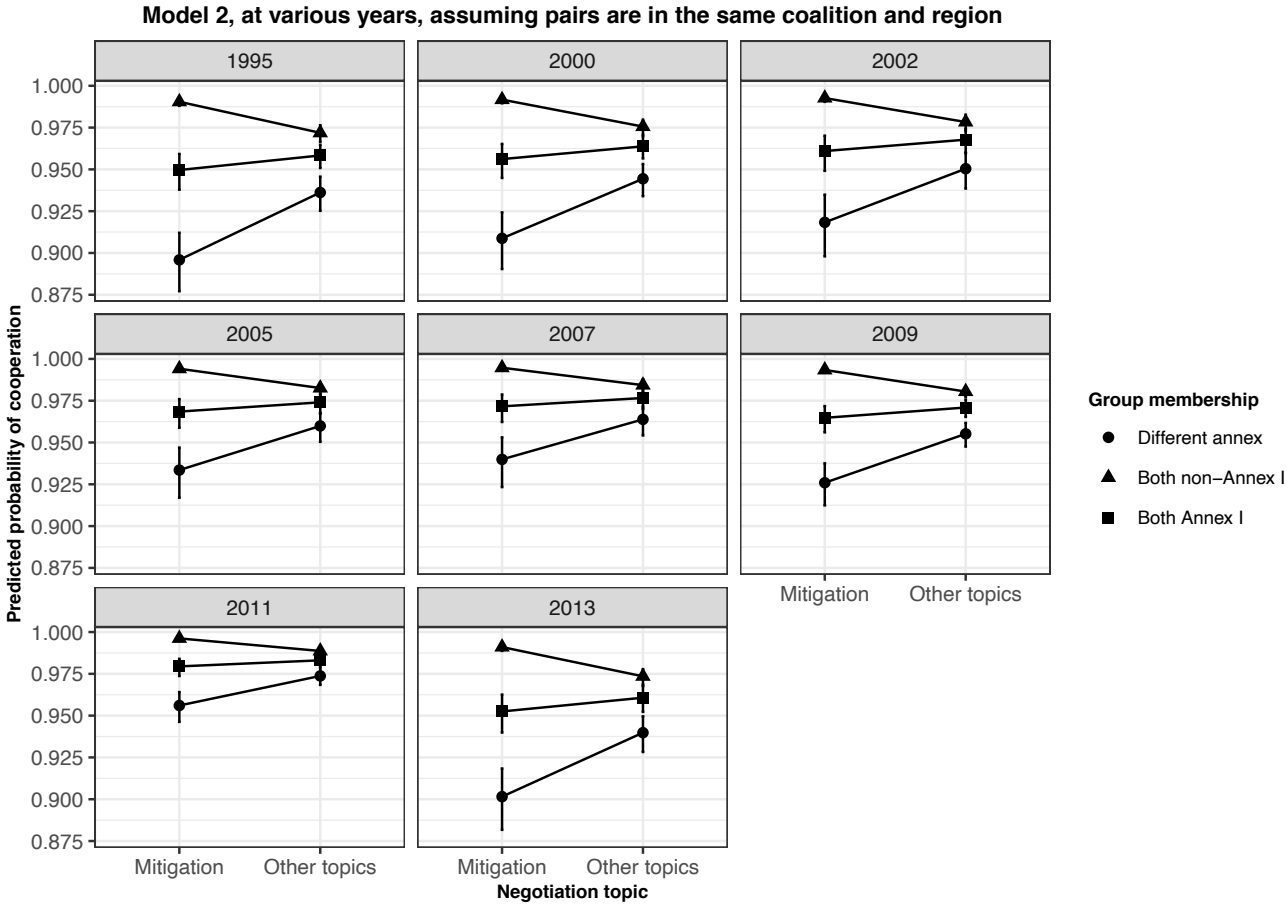


Figure A9: Interaction plots of alternative specifications (continued)



4.3 Figure A10: Interaction plots of Model 2 under different control variable values



4.4 Sensitivity analysis of omitted variable bias

At the heart of our analysis lies the assumption that we are able to identify the effect of group membership on negotiation behavior without being able to observe the counterfactual: the absence of such groups under the UNFCCC. Our identification strategy, thus, relies on adding as many controls as possible that we consider to be relevant for selection into the groups (Annex I and non-Annex I) and for negotiation behavior. However, there might still be unobserved confounders that are correlated with both annex membership and cooperative behavior. We follow Cinelli and Hazlett (2020) to assess the sensitivity of our results to such omitted variable bias.

Cinelli and Hazlett's sensitivity analysis is applicable to linear models with a binary treatment variable. In our case, however, we have a binary dependent variable, so that our main specification uses a logit model. In Table 1 and Figure A9 we show, however, that our results regarding the effect of annex membership on cooperative negotiation behavior are robust to using a linear probability model instead of a logit. Our main explanatory (or treatment) variable is a categorical variable indicating whether the two countries involved in a negotiation interaction are both members of Annex I, both members of non-Annex I, or members of different annexes. To run the sensitivity analysis we decompose this three-way categorical variable into two dummies of the effect of being together in Annex I versus being in different annexes, and of the effect of being together in non-Annex I versus being in different annexes. The sensitivity analysis is run separately on these two dummies.

Cinelli and Hazlett propose the concept of "robustness value" as a measure to assess the robustness of a coefficient to unobserved confounders. If the confounder's association to the treatment (in our case, membership to the same annex) and to the outcome (cooperative negotiation behavior) is below this threshold, then the treatment is robust to the effect of such a confounder. In addition, they suggest to use contour plots to display the extent to which a confounder's association to the treatment and to the outcome (in terms of partial R^2) impacts the statistical significance of the treatment. To help the assessment of what confounders might be plausible, they propose to benchmark the confounders on the basis of the strength of existing regression covariates. These tools are implemented in the package *sensemakr* in R (Cinelli and Hazlett 2019).

The robustness value of the treatment "Both Annex I" is 8.43%: Unobserved confounders would need to explain at least 8.43% of the residual variance of both the treatment and the outcome for the null hypothesis that the true treatment effect is equal to 0 to not be rejected at 0.05 significance level. The robustness value of the treatment "Both non-Annex I" is 11.71%: Unobserved confounders would need to explain at least 11.71% of the residual variance both of the treatment and the outcome to make the effect of being together in non-Annex I statistically insignificant.

We use two of our covariates to help us consider whether such confounders are plausible. The variable *reciprocity* measures the tendency of countries to reciprocate past cooperative or conflictual negotiation behavior, and it has a consistently significant and positive effect on the likelihood of cooperative behavior, as expected from network theory. The variable *same coalition* indicates whether the two countries in a dyad are members of the same negotiating coalition. Coalitions are a central feature of the climate change negotiations and consist of groups of countries with similar interests and positions in the negotiations that get together voluntarily to gain negotiating power. Given their similar interests and also the fact that they actively coordinate common positions, it is to be expected that countries that belong to the same coalition will frequently support each other's positions during the negotiations, and rather avoid criticizing or opposing each other. Indeed, in our regressions, same coalition has a robust positive effect on the likelihood of cooperative negotiation behavior, which is also substantial: all else equal, on average, members of the same coalition are 18% more likely to behave cooperatively than countries that do not share a coalition membership.

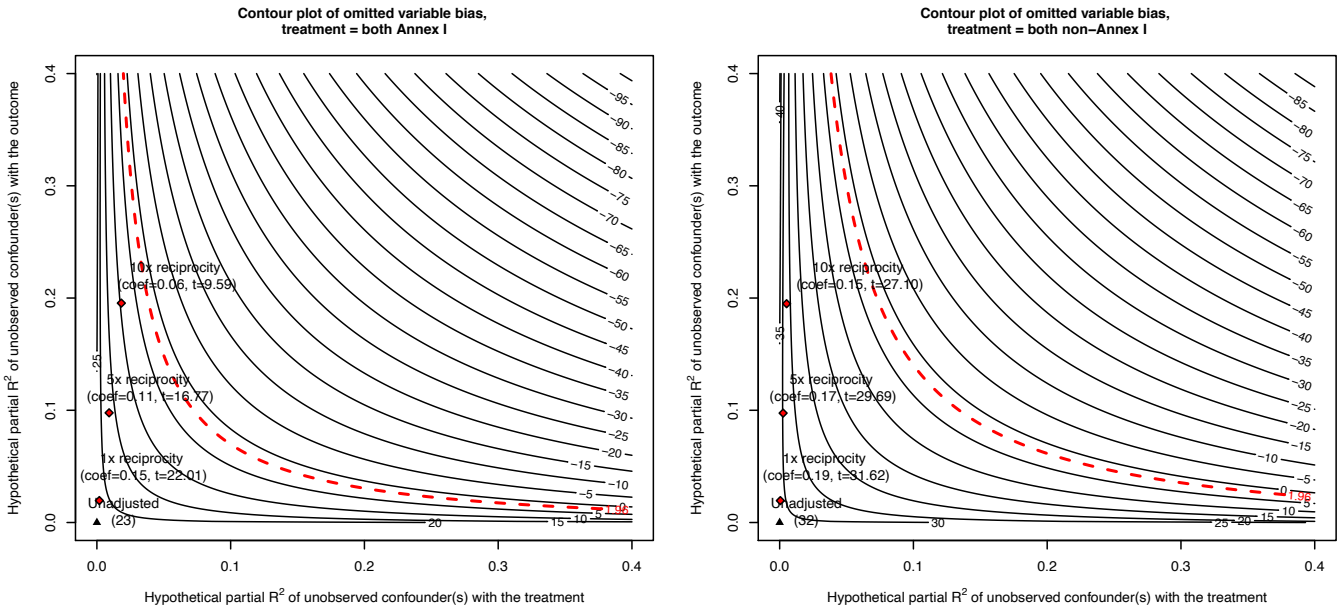
Figures A11 and A12 display the contour plots based on *reciprocity* and on *same coalition*, respectively. The red dotted line shows the t-value threshold at which the effect of our main explanatory variable, either being together in Annex I (left panel) or being together in non-Annex I (right panel), on our outcome (cooperative negotiation behavior) would become insignificant at a 5% level.

An unobserved confounder that is ten times as strong as the covariate *reciprocity* could explain about 19% of the residual variance of the outcome (cooperative behavior), and 1.83% of the residual variance of the treatment "being together in Annex I", or 0.5% of the residual variance of the treatment "being together in non-Annex I". As shown in Figure A11, such a confounder would not be strong enough to bring down the estimated effects of being together in Annex I or of being together in non-Annex I to a non-significant level. In addition, those effects would still be substantial in size.

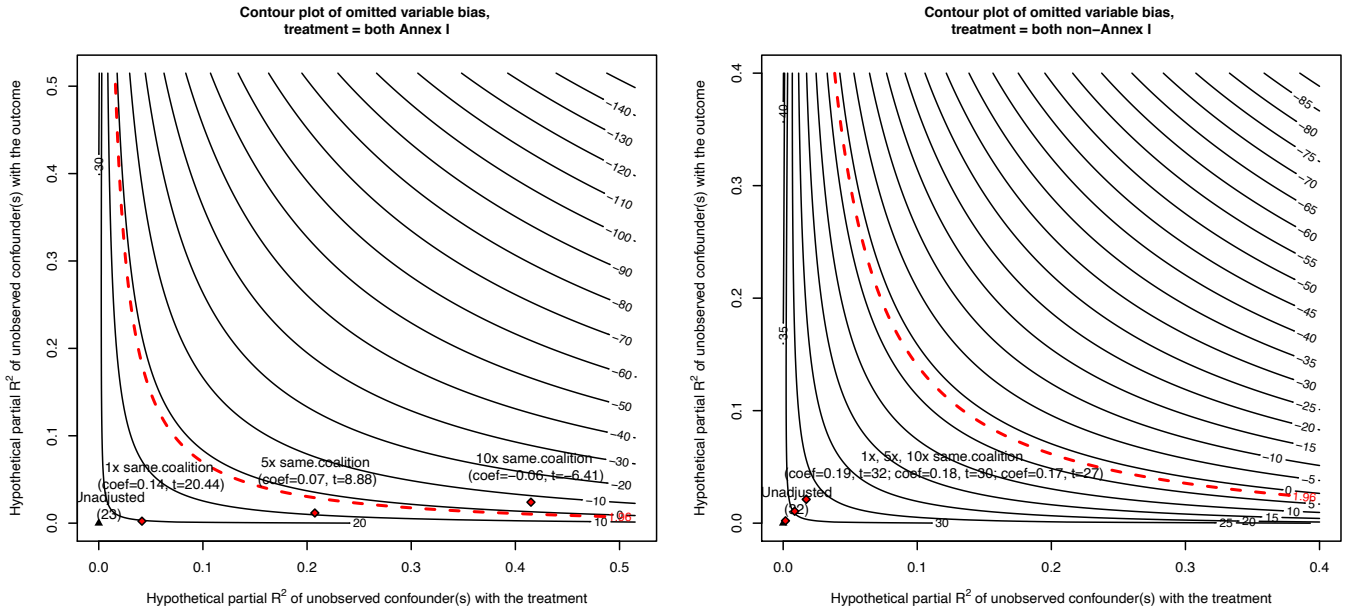
Regarding *same coalition*, while a confounder that is five times as strong as this covariate would not affect the estimated effect of being together in Annex I on cooperative negotiation behavior (as it would remain positive and significant, with a substantial size), a confounder that is ten times as strong as same coalition would be sufficient to affect this result substantially: it would make the coefficient on being together in Annex I negative and significant, with a t-value of -6.41. At the same time, however, a confounder ten times as strong as same coalition would have no substantial impact on the effect of being together in non-Annex I on cooperative behavior. Given the important role that coalitions play in the climate negotiations, we cannot really imagine a confounder that could be a 10 times stronger predictor of cooperative negotiation behavior than common coalition membership.

In summary, we conclude that both the effect of being together in non-Annex I and of being together in Annex I are robust to quite a sizable unobservable confounder, which makes us more confident that our choice of control variables is sufficient to identify the true effect of common annex membership on negotiation behavior.

4.5 Figure A11: Contour plots of omitted variable bias, benchmarked on covariate *reciprocity*



4.6 Figure A12: Contour plots of omitted variable bias, benchmarked on covariate *same coalition*



4.7 Table A9: Results from the rate (survival) model

	Logit (survival) regressions on: Event occurrence			
	Cooperative events		*Conflictual events*	
	Model 5	*Model 6*	*Model 7*	*Model 8*
Main independent variables and interactions				
Both non-Annex I	-0.129 (0.044)**	-0.128 (0.044)**	-0.105 (0.080)	-0.155 (0.081)
Both Annex I	0.475 (0.046)***	0.488 (0.046)***	-0.346 (0.103)***	-0.339 (0.104)**
Year dummies	YES	YES	YES	YES
Both non-Annex I * Year dummies	YES	YES	YES	YES
Both Annex I * Year dummies	YES	YES	YES	YES
Network statistics				
Sender outdegree		-0.471 (0.056)***		-0.213 (0.115)
Target indegree		-0.100 (0.054)		0.260 (0.114)*
Reciprocity		4.285 (0.830)***		3.960 (4.249)
Triad friend of friends		-2.717 (0.351)***		2.206 (0.892)*
Triad friend of enemies		0.448 (0.617)		0.322 (1.019)
Triad enemy of enemies		3.712 (1.022)***		3.795 (2.218)
Triad enemy of friends		1.599 (0.614)**		-1.126 (0.993)
Sender similarity		8.134 (0.309)***		2.894 (0.872)***
Target similarity		11.820 (0.368)***		3.588 (1.025)***
Control variables				
Population sender (log)	-0.017 (0.003)***	-0.028 (0.003)***	-0.006 (0.007)	-0.013 (0.007)*
Population target (log)	-0.015 (0.003)***	-0.029 (0.003)***	-0.009 (0.007)	-0.023 (0.007)***
Income sender (log)	-0.000 (0.015)	-0.018 (0.015)	-0.023 (0.033)	-0.029 (0.034)
Income target (log)	-0.001 (0.015)	-0.020 (0.015)	-0.068 (0.036)	-0.069 (0.036)
CO_2 per capita sender (log)	-0.022 (0.010)*	-0.011 (0.010)	-0.015 (0.024)	-0.008 (0.024)
CO_2 per capita target (log)	-0.020 (0.010)*	-0.012 (0.010)	-0.002 (0.026)	0.004 (0.026)
Democracy sender	0.014 (0.002)***	0.010 (0.002)***	0.017 (0.006)**	0.015 (0.006)*
Democracy target	0.014 (0.003)***	0.007 (0.003)**	0.013 (0.007)	0.010 (0.007)
ND-Gain index sender	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.002)	-0.002 (0.002)
ND-Gain index target	-0.000 (0.001)	-0.000 (0.001)	0.003 (0.002)	-0.001 (0.002)
Forest area sender	-0.000 (0.000)	-0.001 (0.000)***	-0.001 (0.001)	-0.002 (0.001)**
Forest area target	-0.000 (0.000)	-0.001 (0.000)**	0.000 (0.001)	-0.000 (0.001)
Fossil rents sender	0.002 (0.001)*	-0.001 (0.001)	0.003 (0.002)	0.001 (0.002)
Fossil rents target	0.002 (0.001)*	-0.001 (0.001)	0.008 (0.002)***	0.006 (0.002)**
English sender	-0.046 (0.012)***	-0.035 (0.012)**	-0.036 (0.029)	-0.039 (0.029)
English target	-0.048 (0.012)***	-0.023 (0.012)	-0.052 (0.029)	-0.058 (0.029)*
Trade flows (log)	0.005 (0.001)***	0.001 (0.001)	0.007 (0.002)***	0.004 (0.002)**
Aid flows (log)	0.003 (0.001)**	0.006 (0.001)***	-0.002 (0.002)	0.000 (0.002)
Same region	-0.018 (0.011)	-0.008 (0.011)	-0.031 (0.034)	-0.016 (0.034)
Same coalition	0.059 (0.013)***	0.048 (0.014)***	-0.004 (0.059)	-0.015 (0.059)
Coalition member	0.134 (0.025)***	0.134 (0.026)***	0.138 (0.107)	0.159 (0.108)
Interventions sender	0.002 (0.000)***		0.001 (0.000)***	
Interventions target	0.002 (0.000)***		0.001 (0.000)***	
AIC	445850	444586	87031	86991
BIC	446860	445685	87909	87946

	Logit (survival) regressions on: Event occurrence			
	Cooperative events		*Conflictual events*	
	Model 5	*Model 6*	*Model 7*	*Model 8*
Log Likelihood	-222845	-222206	-43436	-43408
Observations	2258695	2261278	432316	432666

Intercepts not shown. Standard errors in parentheses. Effects of interaction terms, which are our main covariates of interest but are too many to be displayed in the table, are shown graphically in Figure 5 in the main article.
***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$.

4.8 Table A10: Robustness checks for the rate (survival) model

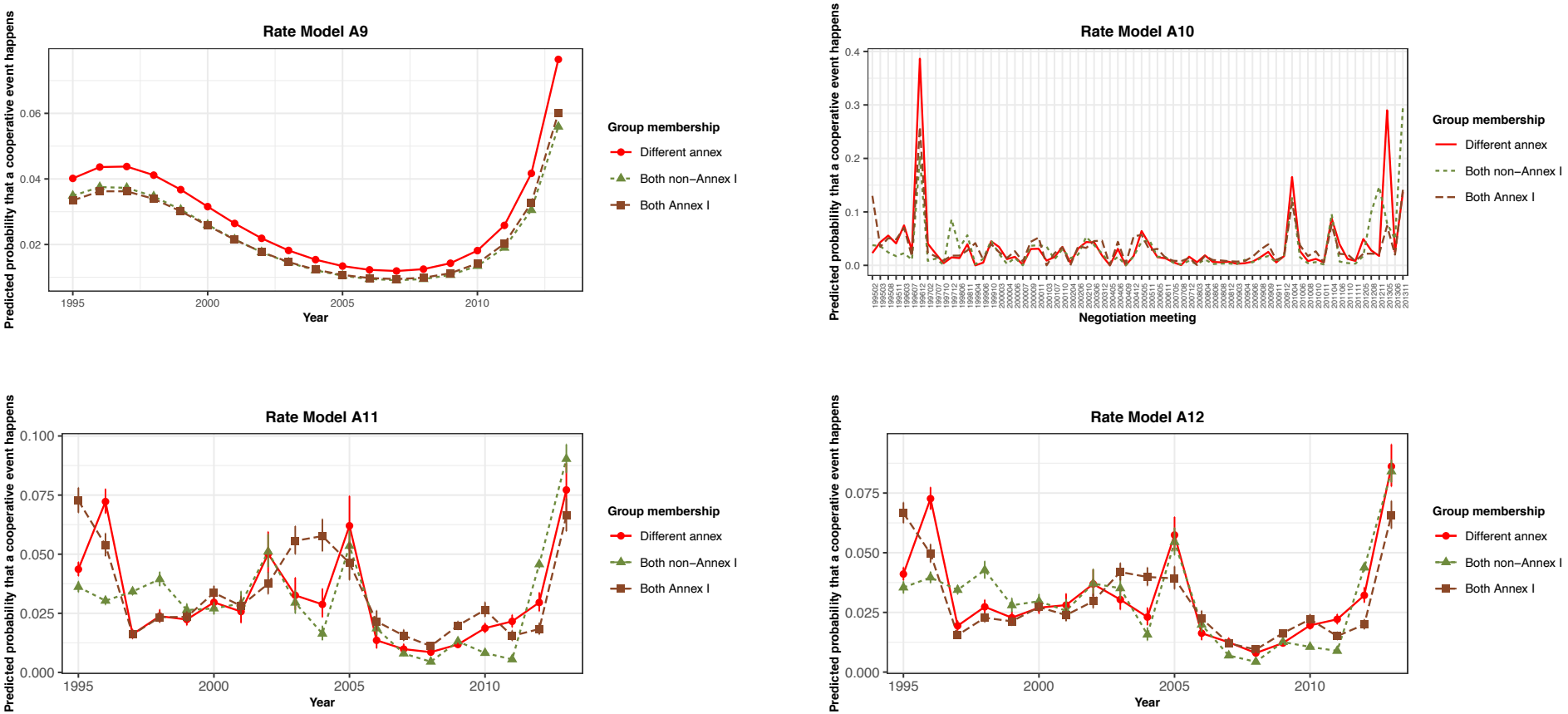
	Logit (survival) regressions on: Event occurrence.							
	Cooperative events				*Conflictual events*			
	Model A9 *Year polynomial*	*Model A10* *Meeting fixed effects*	*Model A11* *No coalitions*	*Model A12* *No imputed / completed data*	*Model A13* *Year polynomial*	*Model A14* *Meeting fixed effects*	*Model A15* *No coalitions*	*Model A16* *No imputed / completed data*
Network statistics								
Sender outdegree	-0.81 (0.06)***	-1.13 (0.06)***	-0.34 (0.08)***	-0.59 (0.06)***	-0.37 (0.11)**	-0.20 (0.12)	-0.38 (0.17)*	-0.26 (0.12)*
Target indegree	-0.52 (0.05)***	-0.73 (0.06)***	0.05 (0.08)	-0.26 (0.06)***	-0.06 (0.11)	0.29 (0.12)*	0.16 (0.17)	0.17 (0.12)
Reciprocity	-1.63 (0.81)*	7.63 (0.83)***	9.13 (1.19)***	3.11 (0.85)***	1.09 (4.23)	14.30 (4.27)***	7.21 (8.70)	2.90 (4.34)
Triad friend of friends	2.63 (0.34)***	-7.72 (0.36)***	-4.76 (0.45)***	-1.44 (0.38)***	-1.63 (0.79)*	3.60 (0.92)***	0.47 (1.38)	2.17 (0.92)*
Triad enemy of enemies	9.53 (0.96)***	15.80 (1.06)***	3.12 (1.34)*	3.46 (1.06)**	22.03 (1.97)***	-6.13 (2.31)**	5.03 (3.72)	4.75 (2.26)*
Triad friend of enemies	-2.23 (0.62)***	3.05 (0.61)***	-0.89 (1.00)	0.84 (0.63)	3.68 (1.00)***	-1.39 (1.03)	1.51 (1.57)	0.60 (1.06)
Triad enemy of friends	-0.95 (0.62)	4.37 (0.61)***	-0.05 (1.00)	1.91 (0.63)**	0.64 (0.98)	-3.11 (1.01)**	-3.55 (1.72)*	-0.77 (1.03)
Sender similarity	6.88 (0.31)***	8.46 (0.31)***	9.52 (0.40)***	7.25 (0.34)***	0.86 (0.88)	3.73 (0.89)***	4.37 (1.20)***	2.70 (0.93)**
Target similarity	8.91 (0.37)***	12.21 (0.38)***	13.18 (0.47)***	10.33 (0.41)***	0.24 (1.01)	5.36 (1.07)***	4.11 (1.33)**	2.77 (1.09)*
Main independent variables and interactions								
Both non-Annex I	20.67 (4.13)***	0.51 (0.08)***	-0.20 (0.05)***	-0.15 (0.05)**	-13.58 (9.00)	-0.58 (0.11)***	-0.04 (0.10)	-0.20 (0.09)*
Both Annex I	7.27 (4.95)	1.85 (0.08)***	0.54 (0.05)***	0.51 (0.05)***	-35.55 (13.13)**	-0.19 (0.13)	-0.16 (0.12)	-0.34 (0.11)**
Year	28894 (492)***				12743 (1012)***			
Year ^{2}	-14.43 (0.25)***				-6.38 (0.50)***			
Year ^{3}	0.00 (0.00)***				0.00 (0.00)***			
Both non-Annex I * Year	-0.01 (0.00)***				0.01 (0.00)			
Both Annex I * Year	-0.00 (0.00)				0.02 (0.01)**			
Meeting fixed effects	NO	YES	NO	NO	NO	YES	NO	NO
Both non-Annex I * Meeting	NO	YES	NO	NO	NO	YES	NO	NO
Both Annex I * Meeting	NO	YES	NO	NO	NO	YES	NO	NO
Year dummies	NO	NO	YES	YES	NO	NO	YES	YES
Both non-Annex I * Year dummies	NO	NO	YES	YES	NO	NO	YES	YES
Both Annex I * Year dummies	NO	NO	YES	YES	NO	NO	YES	YES
Control variables								
Population sender (log)	-0.01 (0.00)***	-0.02 (0.00)***	-0.03 (0.00)***	-0.02 (0.00)***	-0.02 (0.01)*	0.00 (0.01)	0.02 (0.01)	-0.02 (0.01)*
Population target (log)	-0.01 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.01)**	-0.01 (0.01)	-0.00 (0.01)	-0.02 (0.01)**
Income sender (log)	0.01 (0.01)	-0.06 (0.02)***	-0.00 (0.02)	-0.02 (0.02)	-0.05 (0.03)	-0.01 (0.03)	0.01 (0.04)	-0.03 (0.04)
Income target (log)	0.00 (0.01)	-0.06 (0.02)***	0.01 (0.02)	-0.02 (0.02)	-0.03 (0.03)	-0.05 (0.04)	-0.06 (0.04)	-0.07 (0.04)
CO_2 per capita sender (log)	-0.01 (0.01)	0.01 (0.01)	-0.02 (0.01)*	-0.00 (0.01)	-0.01 (0.02)	-0.01 (0.02)	-0.03 (0.03)	0.01 (0.03)

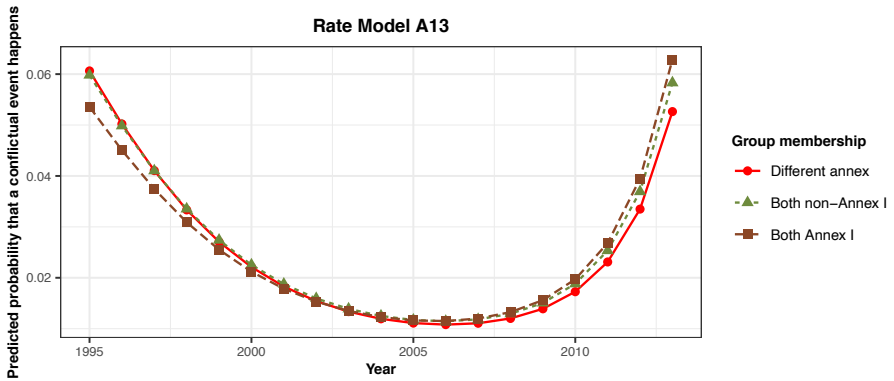
	Logit (survival) regressions on: Event occurrence.							
	Cooperative events				*Conflictual events*			
	Model A9	*Model A10*	*Model A11*	*Model A12*	*Model A13*	*Model A14*	*Model A15*	*Model A16*
CO_2 per capita target (log)	-0.00 (0.01)	0.01 (0.01)	-0.03 (0.01)**	0.00 (0.01)	-0.05 (0.03)	0.02 (0.03)	-0.01 (0.03)	0.01 (0.03)
Democracy sender	0.01 (0.00)***	0.01 (0.00)***	0.01 (0.00)**	0.01 (0.00)***	0.02 (0.01)***	0.01 (0.01)	0.02 (0.01)*	0.01 (0.01)
Democracy target	0.01 (0.00)*	0.01 (0.00)***	0.00 (0.00)	0.01 (0.00)*	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
ND-Gain index sender	-0.00 (0.00)	0.00 (0.00)*	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
ND-Gain index target	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Forest area sender	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)**	-0.00 (0.00)*	-0.00 (0.00)*	-0.00 (0.00)**
Forest area target	-0.00 (0.00)***	-0.00 (0.00)***	-0.00 (0.00)**	-0.00 (0.00)**	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Fossil rents sender	-0.00 (0.00)***	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Fossil rents target	-0.00 (0.00)***	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.01 (0.00)**	0.01 (0.00)**	0.01 (0.00)**	0.01 (0.00)**
English sender	-0.06 (0.01)***	-0.05 (0.01)***	-0.03 (0.01)	-0.05 (0.01)**	-0.05 (0.03)	0.01 (0.03)	-0.02 (0.03)	-0.05 (0.03)
English target	-0.05 (0.01)***	-0.04 (0.01)**	-0.01 (0.01)	-0.04 (0.01)**	-0.05 (0.03)	-0.03 (0.03)	-0.08 (0.03)*	-0.05 (0.03)
Trade flows (log)	-0.01 (0.00)***	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)*	-0.00 (0.00)	0.00 (0.00)*
Aid flows (log)	0.01 (0.00)***	0.01 (0.00)***	0.01 (0.00)***	0.01 (0.00)***	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Same region	0.01 (0.01)	-0.06 (0.01)***	-0.01 (0.01)	0.01 (0.01)	-0.01 (0.03)	-0.01 (0.03)	-0.02 (0.04)	-0.00 (0.04)
Same coalition	0.18 (0.01)***	0.15 (0.01)***	-0.01 (0.02)	0.05 (0.02)***	-0.00 (0.06)	-0.01 (0.06)	-0.07 (0.07)	-0.01 (0.06)
Coalition member	0.10 (0.03)***	0.03 (0.03)		0.12 (0.03)***	0.10 (0.11)	0.07 (0.11)		0.18 (0.12)
AIC	454163.56	412705.28	323284.98	383520.47	88974.8	81456.5	55098.13	80085.03
BIC	454643.55	415812.62	324343.16	384607.28	89391.95	84157.02	56002.06	81032.68
Log Likelihood	-227043.78	-206106.64	-161556.49	-191673.24	-44449.4	-40482.25	-27463.06	-39955.52
Observations	2261278	2261278	1630602	1966955	432666	432666	271252	397319

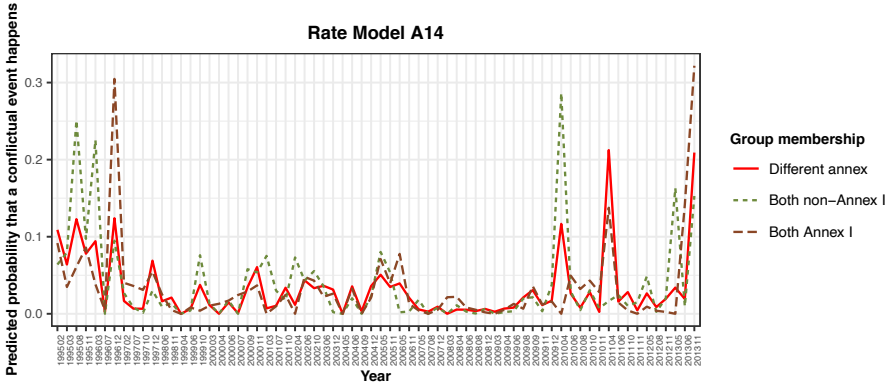
Intercepts not shown. Standard errors in parentheses. Effect of interaction terms shown graphically below. ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$. Explanation of regression models:

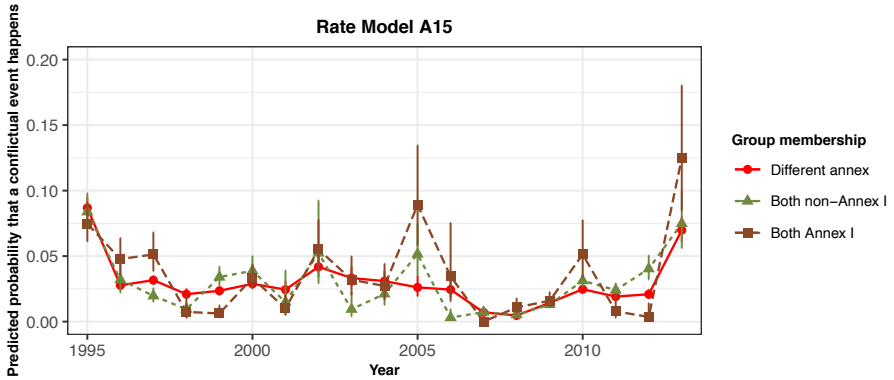
- Model A9: Logistic regression on the occurrence of cooperative negotiation interactions, using a cubic polynomial (year, year^2 and year^3) to model the baseline hazard.
- Model A10: Logistic regression on the occurrence of cooperative negotiation interactions, using fixed effects at the (weekly or two-weekly) meeting level to model the baseline hazard.
- Model A11: Logistic regression on the occurrence of cooperative negotiation interactions; all country coalitions are excluded from the sample.
- Model A12: Logistic regression on the occurrence of cooperative negotiation interactions; the data does not include values imputed or completed from alternative data sources.
- Model A13: Logistic regression on the occurrence of conflictual negotiation interactions, using a cubic polynomial (year, year^2 and year^3) to model the baseline hazard.
- Model A14: Logistic regression on the occurrence of conflictual negotiation interactions, using fixed effects at the (weekly or two-weekly) meeting level to model the baseline hazard.
- Model A15: Logistic regression on the occurrence of conflictual negotiation interactions; all country coalitions are excluded from the sample.
- Model A16: Logistic regression on the occurrence of conflictual negotiation interactions; the data does not include values imputed or completed from alternative data sources.

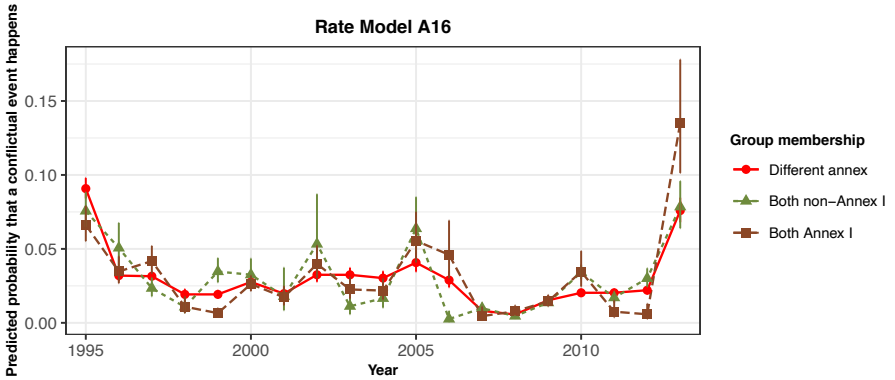
4.9 Figure A13: Effect of group membership on negotiation event frequency over time (alternative specifications)



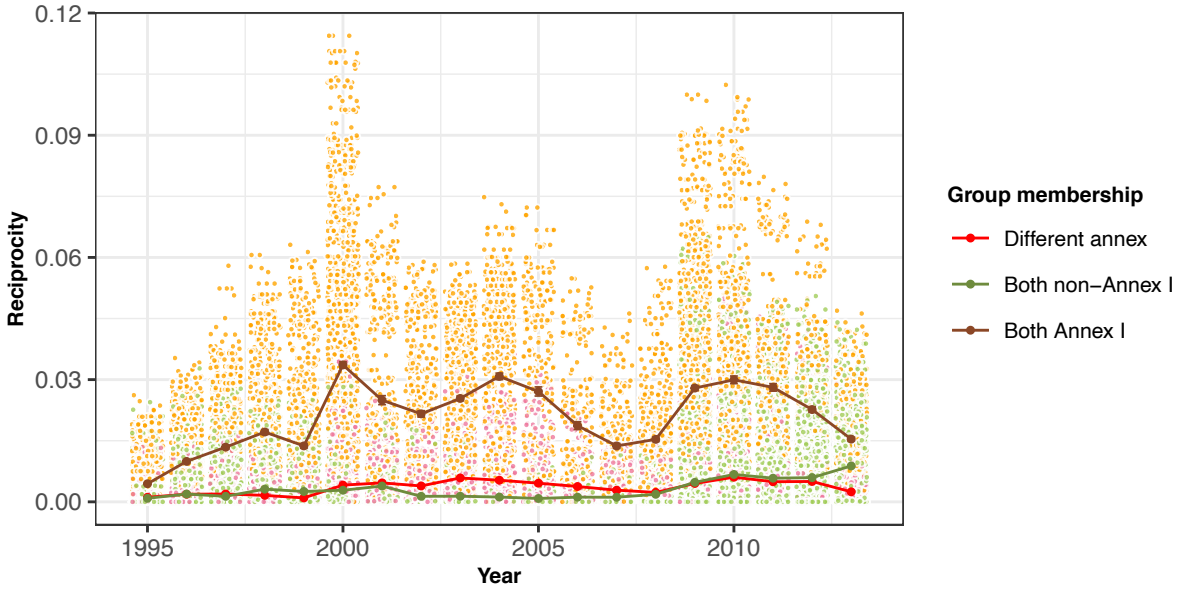

Rate Model A13
Predicted probability that a conflictual event happens
0.06
0.04
0.02
1995
2000
2005
2010
Year
Group membership
Different annex
Both non−Annex I
Both Annex I


Rate Model A14
Predicted probability that a conflictual event happens
0.3
0.2
0.1
0.0
Year
Group membership
Different annex
Both non−Annex I
Both Annex I

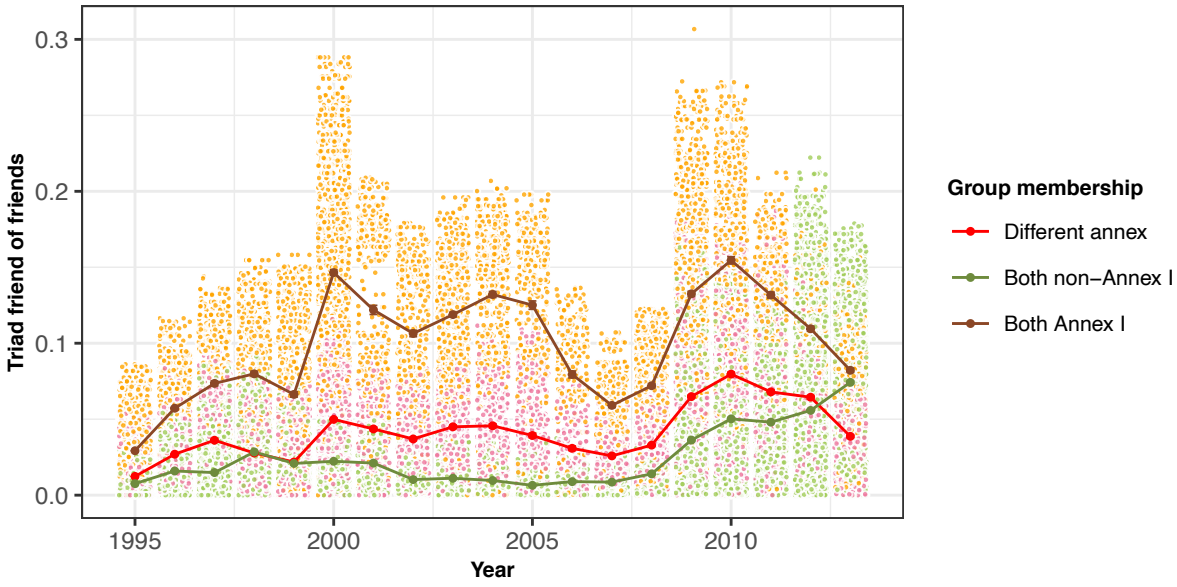

Rate Model A15
Predicted probability that a conflictual event happens
0.20
0.15
0.10
0.05
0.00
1995
2000
2005
2010
Year
Group membership
Different annex
Both non−Annex I
Both Annex I


Rate Model A16
Predicted probability that a conflictual event happens
0.15
0.10
0.05
0.00
1995
2000
2005
2010
Year
Group membership
Different annex
Both non−Annex I
Both Annex I

4.10 Figure A14: Reciprocity over time, by group membership



4.11 Figure A15: Transitivity over time, by group membership



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