

The politicization of the climate: How and why has the Annex I – non-Annex I division affected negotiations under the climate change regime?

Paula Castro (castro@pw.uzh.ch)^{1,2,3}

Marlene Kammerer (kammerer@ipz.uzh.ch)¹

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Abstract

Many multilateral environmental agreements have adopted differentiated rules for groups of countries, based on the recognition of their different circumstances or their different contribution to the problem addressed. Under the United Nations Framework Convention on Climate Change (UNFCCC), such differential treatment was operationalized as a division of the world between the Annex I group of countries with emission reduction targets (OECD and transition economies) and the non-Annex I countries without such commitments (all other countries). Amendments to the list of mitigation obligations by Annex I parties require ratification by three fourths of all parties, which makes changing the status quo extremely difficult. In this article, we seek to shed more light on the argument that by establishing such a rigid differential treatment design the climate regime constructed new lines of confrontation above the substance-based disagreements between countries, rendering broad cooperation more difficult. Accordingly, the Annex I / non-Annex I dichotomy survived for over 20 years despite drastically changing economic and environmental realities. We aim (i) to measure to what extent the institutional split of UNFCCC parties into Annex I and non-Annex I countries led to a division of these two groups in the negotiations, beyond the countries' actual preferences; and (ii), to elucidate what causal mechanisms led to such division. We draw on a new dyadic dataset recording agreements and disagreements in positions of country pairs over time, coded from reports of the climate negotiations between 1995 and 2013 published in the Earth Negotiations Bulletins. The dyadic design allows us to investigate the effect of group membership on cooperative or conflictive behavior between all countries. An extensive set of controls allows disentangling the effect of group construction from the effect of countries' background characteristics. The long time series allows us to test hypotheses regarding two potential causal mechanisms: (1) the creation of new incentives and (2) long-term socialization effects. The analysis is conducted using a Relational Events Model, which combines event history analysis with social network analysis to test network-related effects in sequences of relational events.

Keywords

Global environmental politics, international relations, institutions, negotiations, social network analysis, relational event models, event data analysis

¹ Center for Comparative and International Studies (CIS), University of Zurich

² Centre for Global Cooperation Research, University of Duisburg-Essen

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1 Introduction

There is an increasing interest in the international relations literature – particularly in the neoinstitutionalist traditions – on whether and especially how intergovernmental organizations (IGOs) influence national state behaviour. Even though the traditional realist scholars sustain the view that IGOs are mainly a reflection of the international balance of power and that their influence on state behaviour is therefore limited (Mearsheimer 1995), rationalists believe that institutions may exert influence by rewarding norm-complying behaviour and punishing norm violations (Schimmelfennig 2005); more importantly, constructivists posit that beyond instrumental explanations, the institutions created by IGOs affect member state interests and behaviour by themselves (see e.g. Wendt 1994).

Beyond the relatively common analyses of whether membership to an IGO affects state behaviour (e.g. Pevehouse 2002; Bearce and Bondanella 2007), in this article we are interested in whether and how a specific design feature of an IGO – the introduction of groups of countries with differentiated treatment – affects member state negotiation behaviour and, as a result, the overall quality of cooperation within that IGO. In a previous article, Castro et al. (2014) proposed a ‘constructed peer groups’ hypothesis, which posited that the institutionalized creation of such differentiated country groups created new lines of confrontation between them, leading to a polarization of the negotiation process within the IGO. The argument was tested on a dataset covering two years of negotiations within the United Nations Framework Convention of Climate Change (UNFCCC) and nine prominent participants in them. Two causal mechanisms that could have led to such an effect were proposed, but not tested.

Under the UNFCCC, differential treatment of member states was institutionalized as a way to operationalize the concept of ‘common but differentiated responsibilities’ (CBDR). This is, the idea that countries share the responsibility towards protecting the global environment, but may be obliged to act upon it in different ways according to their different circumstances and levels of responsibility towards harming the environment. As a result, member states were classified into ‘Annex I’ countries with specific greenhouse gas reduction and reporting commitments, and ‘non-Annex I’ countries without such commitments.⁴ Amendments to the list of mitigation obligations by Annex I parties require ratification by three fourths of all parties, making changes to the status quo extremely difficult. Anecdotal evidence from the negotiation process under the UNFCCC suggests that by building these two rigid groups of countries, an unforeseen divide between them was generated. Observers have argued that over time, the distinction between Annex I and non-Annex I countries became more and more politicized and rigid (Depledge 2002; Depledge 2009; Gupta 2010, p. 641).

Castro et al. (2014) argued that by establishing such a rigid differential treatment design, the climate regime in fact constructed new lines of confrontation above the substance-based differences between the two groups of countries. This in turn made broad cooperation more difficult over time. Accordingly, the Annex I / non-Annex I dichotomy managed to survive for over 20 years until quite recently, despite the drastically changing economic and environmental realities of UNFCCC parties. Even though discussions about ‘Nationally Appropriate Mitigation Actions’ for developing countries started back in 2007 with the Bali Action Plan, such actions were considered to be voluntary and subject to the provision of financial support by the developed countries. The second commitment period for the Kyoto Protocol, agreed in 2012, still included mitigation commitments only for a reduced group of developed countries. The Annex I / non-Annex I distinction was finally abolished in the 2015 Paris Agreement, which asks for ‘Nationally Determined Contributions’ to mitigation by all parties.

⁴ Parties listed in Annex I to the Convention include all OECD member states at the time of the agreement, plus the economies in transition. All other parties are considered as non-Annex I countries. Economies in transition, in addition, enjoy special recognition and are thus granted some facilitative measures to help them fulfill their commitments.

In this paper, we seek to build upon that previous work to formally test the two causal mechanisms that had been proposed for this differential treatment effect: creation of new incentives to maintain or abolish the benefits granted to specific groups, and socialization within the constructed groups. The goal is thus twofold: (i), to confirm Castro et al.'s short-term finding that the artificial split of UNFCCC parties into Annex I and non-Annex I countries led to a division of these two groups in the negotiations, beyond the countries' actual preferences; and (ii), to test the proposed causal mechanisms that may have led to such division over time. We draw on a new dyadic dataset that records the agreements and disagreements in positions of country pairs over time, coded from reports of the climate negotiations between 1995 and 2013 published in the Earth Negotiations Bulletins. The dyadic design allows us to investigate the effect of membership in the Annex I and non-Annex I groups on cooperative or conflictive behavior between countries. An extensive set of controls allows disentangling the effect of group construction from the effect of countries' background characteristics. The long time series allows us to test hypotheses regarding two potential causal mechanisms: (1) the creation of new incentives and (2) long-term socialization effects. We follow the approaches used in the socialization literature, which expects socialization effects to take place over long periods of time, as they require the adoption of and identification with common rules and norms. In contrast, if the causal mechanism is simply the creation of new incentives, the effect of group differentiation on negotiation behavior should rather be observed in issue areas related to the differences in commitments between Annex I and non-Annex I, and to group membership. In addition, if the incentives argument is correct, it should more strongly affect behavior during critical negotiation periods in which new agreements are being discussed. At these times, it is more likely that negotiations deal with altering the burden sharing formula existing between Annex I and non-Annex I countries. The analysis has been conducted using a Relational Events Model, which combines event history analysis with social network analysis to test network-related effects in sequences of relational events.

In the next section, we describe in more detail the case of the climate change regime. In section 3, we then present the theoretical background supporting the hypothesized effect of differential treatment on the negotiations, and the two causal mechanisms that may explain it, and lay out our hypotheses. Section 4 describes the data and methods we use to test the hypotheses and section 5 presents our results. In section 6, finally, we summarize our conclusions.

2 Differential treatment in the climate change regime

From its setup, the UNFCCC established a strict differentiation in terms of the commitments to be adopted by different groups of parties with the aim of achieving its ultimate goal, the "stabilization of greenhouse gas concentrations in the atmosphere" at a non-dangerous level (UN 1992b, Art. 2).

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

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

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

Annex I of the Convention listed the developed countries that should take such lead – including basically the OECD members at that time plus selected countries of the former Soviet Union. Given that the Convention did not include legal obligations for any set of parties, the differentiation was at that time important conceptually but not really consequential. The 1997 Kyoto Protocol led to binding emission reduction targets for a list of countries that widely corresponds to the Convention’s Annex I (Annex B of the Kyoto Protocol).⁵ A subset of Annex I countries, listed in Annex II to the Convention, further agreed to provide financial support to developing countries to assist them with their reporting requirements, provide technology transfer and capacity building and contribute to adaptation processes in particularly vulnerable countries (UNFCCC 1992, Art. 4.3).⁶

It was from the outset clear that neither the Convention nor the Kyoto Protocol would be sufficient to effectively address climate change. They were rather regarded as the starting point of a “dynamic instrument for long-term climate policy” that would evolve to accommodate stronger Annex I party commitments and new actions by non-Annex I parties (Depledge 2002, p. 41). In practice, however, differentiation between industrialized and developing countries was designed in a way that it is very difficult to change, particularly in the protocol.

Two possible avenues exist for introducing changes to the Annex I – non-Annex I division. First, the Convention and Protocol allow for the accession of individual non-Annex I countries to Annex I status. Second, a comprehensive new negotiation round can be launched to agree on new emission control obligations for any party.

Under the Convention, amendments to Annex I are to be adopted by the Conference of the Parties by consensus, and if consensus is not possible, by a three-fourths majority of the parties present and voting (Article 15). Such amendments enter into force automatically for all parties, except for those that, within six months, send a written non-acceptance notification (Article 16). In addition, the Convention’s Article 4.2(f) mandates parties to review its Annexes I and II before the end of 1998, and consider potential amendments to them. Article 4.2(g) stipulates further that any non-Annex I party may notify its intention to be bound by the Annex I party mitigation and reporting commitments. In this case, the party keeps its non-Annex I status under the Convention, but is considered as an Annex I party under the Kyoto Protocol (Kyoto Protocol, Art. 1.7).

The tacit acceptance procedure has allowed changes to the Convention’s annexes to happen on a few occasions. In 1997, Croatia, Czech Republic, Liechtenstein, Monaco, Slovakia and Slovenia were added to Annex I. These changes were all made invoking the provisions under Article 4.2(f) or 4.2(g) of the Convention, and took place just in time for these countries to be included in Annex B to the Kyoto Protocol when this new agreement was adopted the same year. Similarly, Malta and Cyprus were added to Annex I upon accessing the EU in 2009 and 2011, respectively.

Otherwise, changes of the country list in Annex I have proven to be extremely contentious. Turkey, as an OECD member, was originally included in Annexes I and II of the Convention, but opposed this as its per capita income, GHG emissions and energy consumption were much lower than the OECD average. After years of discussions, in 2001 parties finally accepted to delete Turkey only from Annex II, and to consider it an Annex I party with special circumstances akin to those granted to economies in transition (Depledge 2002, p. 44). In 1998 Argentina proposed to take up voluntary emission targets, but this was fiercely opposed by other developing countries, who feared that this would generate more pressure on developing countries to adopt emission reduction commitments (Grubb et al. 1999, p. 251f).

⁵ While the US is listed in Annex B, it did not ratify the Protocol. Turkey is the only Annex I country that ratified the Kyoto Protocol, but, for exceptional reasons, is not included in Annex B.

⁶ Annex II to the Convention only lists the OECD countries.

Kazakhstan represents another case that took years to decide upon. In 1999, Kazakhstan (a Convention party since 1995) presented a proposal to amend Annex I so that it includes its name. While Annex I countries welcomed the proposal, several developing countries were skeptical. Kazakhstan was much more similar to developing countries than the other (European) states that had previously joined Annex I. Developing countries thus feared that such an amendment would set a precedent that would put pressure on them to join. As a result, a full amendment to Annex I proved impossible, and in 2001 Kazakhstan instead chose to notify a voluntary emissions target in accordance with Article 4.2(g) of the Convention. Kazakhstan's chief interest, however, was to participate in the Kyoto Protocol's market mechanisms – emissions trading and joint implementation – and thus potentially achieve economic gains (Depledge 2002, p. 42). Therefore Kazakhstan also pursued an amendment of the Protocol's Annex B.

But amending the Protocol's Annex B – which lists Annex I parties' emission reduction commitments – is even more cumbersome. Amendments are to be adopted by at least a three-fourths majority of the parties present and voting. After adoption, they require ratification by at least three fourths of parties to the Protocol to enter into force. In addition, any amendment to Annex B requires written consent by the party or parties concerned (Protocol Articles 20 and 21). Thus, the attempts by Kazakhstan and also by Belarus to be added to the list of parties with reduction targets in the Protocol's first commitment period (2008-2012) were accompanied by long negotiations and were never ratified by a sufficient number of parties to enter into force before the end of 2012. While one of the reasons of these hurdles were environmental concerns regarding the stringency of the proposed targets, it is still true that a simpler amendment procedure would be required for the system to evolve in response to changing realities.

Even beyond these struggles regarding mitigation-related commitments, it seems that the distinction between Annex I and non-Annex I countries has become more and more politicized over the years (Höhne 2005, p. 37). Contentious issues such as the financing of mitigation and adaptation in developing countries, further reporting requirements, the accounting of avoided deforestation, and the adoption of future commitments, all were discussed along these lines. Thus, while Annex I was initially meant to list the countries that were to 'lead' the effort of reducing greenhouse gas emissions, in practice it evolved into a rigid classification of parties into two static country groups. In the next section we discuss the theoretical basis behind the Annex I – non-Annex I division and behind its hypothesized effect on the negotiations.

3 Theoretical background

3.1 Differential treatment of parties to multilateral environmental agreements

Differential treatment of parties to an IGO has become a relatively common feature of international law, particularly among multilateral environmental agreements (MEAs). The basis of this differentiated treatment is the recognition, already in the Rio Declaration, of states' different circumstances and levels of contribution to environmental degradation and thus of their differentiated responsibility with respect to the protection of the environment (UN 1992a). In practice, such 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 (Matsui 2002; Rajamani 2006).

Moreover, the ideas of differential treatment and differentiated responsibilities are not confined to the environmental arena. Bukovansky et al. (2012) apply the concept also to nuclear proliferation and to the protection of the global financial system after the 2008 crisis. The creation of different classifications of 'Special and Differential Treatment' is an important issue within World Trade Organization negotiations (Hoekman et al. 2004; Page and Kleen 2005; Hoekman and Özden 2006; Eagleton-Pierce 2013). Finally,

differential treatment has been proposed as a way to address the role of emerging donors within the international development aid system (Bracho 2015).

Legal scholars have placed the emergence of differential treatment in international agreements in an historical and international law context, examining it also from a normative perspective (Cullet 1999; Halvorssen 1999; Rajamani 2000; Cullet 2003; Hoekman et al. 2004; Hepburn and Ahmad 2005; Page and Kleen 2005; Rajamani 2006; Honkonen 2009). They have detailed the philosophical basis supporting the use of differential treatment as a way to ensure equity under international environmental law, discussed the arguments supporting and opposing the introduction of differential treatment, and discussed the different ways in which it has been operationalized in several MEAs. A very recent special edition of the journal *Transnational Environmental Law* seeks to reassess the CBDR principle in the climate change regime from a legal perspective (Peel 2016).

In international relations, the role of differential treatment in shaping the quality of cooperation in IGOs is an issue that is starting to raise interest. Some IR scholars have started to incorporate sociological ideas into their analysis of the world order. Among such ideas, the notion that the world community constitutes a stratified society of countries that are in different ways ‘classified’ into different roles that go beyond those given by their material power (Bukovansky et al. 2012) is one such example that comes close to our idea of how differential treatment shapes relations between countries. In a similar direction goes the idea that specific countries or hegemons assign themselves ‘special responsibilities’ towards global problems and their solutions and are therefore entitled special rights and duties (Bukovansky et al. 2012). Going a step further, Pouliot (2016, p. 37) argues that rather than supporting sovereign equality, multilateral diplomacy creates a stratified society that not only reflects power inequalities, but also produces them, reinforcing for example hierarchical relations between the North and the South.

Differential treatment is a tool to acknowledge that states – despite the sovereign equality principle – have different national circumstances with respect to a given problem and its economic implications. It thus becomes a tool to address the distribution problem that deters cooperation. Handl (1991, p. 64) argues that such selective incentives are necessary to reflect the fact that the expected costs and benefits of any regime will vary from state to state. Differential obligations and selective incentives are regarded as tools for making ambitious or ‘better-than-minimum’ measures attractive to parties. Reluctant parties can thus be persuaded to modify their positions. “Paradoxically, loopholes can upgrade the overall standard of obligations in an agreement – rising them above the predictable common denominator” and encouraging more states to join the agreement (see also Underdal 1980; Sand 1990, pp. 220-221).

Still, differential treatment is not a feature of all international agreements and, more importantly, it has not always been designed in the same way. We study MEAs to examine these differences, as in this issue-area differential treatment has been applied frequently and in various ways. Indeed, some MEAs, like the climate change regime, have incorporated a very rigid differential treatment design, while others, such as the ozone regime, have a more dynamic design that allows parties to move from one group to the other according to predefined criteria without requiring renegotiation. We have thus elsewhere argued that, while differential treatment may be a precondition for some parties to enter an agreement in the first place, it may lead to new incentives that make broader (and deeper) cooperation more difficult in the long term, and that this effect crucially depends on how it has been designed (Castro et al. 2014; see also Prys-Hansen and Franz 2015; Castro 2016).

Differential treatment allows groups of parties to soften or completely avoid costly commitments in quite a permanent way: at any given point in time parties either belong to the group with or to the group without such preferences. However, depending on how rigid or dynamic (flexible) the differential treatment provisions are, it will be easier or more difficult for a state to shift groups in response to

changing national circumstances. In this sense, the actual design of differential treatment allows it to work in a similar way as other flexibility provisions that have been studied by the literature on the rational design of IGOs (Rosendorff and Milner 2001; Kucik and Reinhardt 2008).

Handl notes that in the absence of appropriate justification, differential treatment – particularly with respect to core obligations – will be problematic in the long run: Such differential treatment implies higher administrative costs given the greater complexity of the regime; resulting distortions to international trade will be more difficult to reverse than in the case of softer approaches to differentiation like the provision of finance; and the long-term effectiveness might be compromised because weak (or inexistent) obligations for some countries are likely to preclude them from making technological, managerial and regulatory progress towards the goal of the agreement (Handl 1991, p. 65).

There are also bargaining costs related to flexibility: if on the sake of flexibility states negotiate shorter agreements or include escape clauses, renegotiation of new treaty terms and deciding on whether to accept invocations of the escape clause is costly. In addition, states have an incentive to interpret flexibility provisions in a broader sense than originally intended, in order to serve their own interests. Renegotiation of all these issues provides an opportunity for states to use delaying tactics to be able to profit from favourable terms for a longer time (Koremenos et al. 2001).

In the particular case of the climate change regime, differential treatment not only applies to the core mitigation and finance-related obligations, but also institutionalized two very rigid groups of countries, so that, in practice, it became impossible to modify the list of parties with emission reduction commitments under the Kyoto Protocol's first commitment period, despite several attempts to this end. Thus, while since the 1990s countries' characteristics and related preferences have evolved, their membership status to Annex I (or the Kyoto Protocol's Annex B) did not change. While this is an extreme case of differential treatment, it provides us with the opportunity to disentangle the effects of country characteristics from those of regime design (in terms of differential treatment) on countries' negotiation behaviour.

3.2 How differential treatment of parties may affect negotiation behaviour

Clearly, the positions taken up and expressed by states in multilateral negotiations, the way they react to their peers and eventually the outcome of the negotiations all depend on countries' characteristics and related preferences. However, in addition to this effect of country characteristics and related preferences, the existence of institutionalized country groupings may have an effect of its own. This has been termed the 'constructed peer group' hypothesis by Castro et al. (2014). The construction of such groups by the regime itself (in contrast to coalitions created voluntarily to better represent common positions of sympathising groups of countries) results in new commonalities among their member countries. On the one hand, new incentives to 'fight' for common goals are created. On the other, a group identity similar to that of a peer group develops, in analogy to what institutional socialization theory posits for the effect of participating in IGOs (e.g. Bearce and Bondanella 2007). In turn, this affects the negotiation dynamics, and eventually leads to the persistence of these constructed groups, even for other purposes than those intended initially.

In the climate change context, we argue that the creation of the artificial divide between Annex I and non-Annex I countries has been reinforced in subsequent negotiation rounds leading to ever increasing differences between these two groups across different policy areas. For our analysis, we thus formulate the following hypothesis:

Hypothesis 1: All else 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).

This first general hypothesis rests on the tradition of the institutionalist literature in international relations, on theoretical considerations about how groups behave in negotiations or similar situations, and about how the creation of new groups generates new incentives which, in turn, influence negotiation dynamics. Below, we describe the two causal mechanisms that were posited by Castro et al. (2014) to explain this effect of group construction: (i) new incentives created by the constructed groups, and (ii) socialization and group psychology.

3.3 *Differential treatment and creation of new incentives*

Membership to the created groups is attached to different sets of obligations and privileges. The members of the group subject to privileges, such as less stringent obligations, more time to comply with them, or financial support, are thus driven to protect this preferential treatment and will argue for the continuation of the status quo or the expansion of the preferences during the negotiations. Members of the group with stronger financial or environmental obligations, in contrast, will lobby for the abolishment of the preferential treatment, for broadening their group's membership or for a weakening of their own commitments. In either case, group construction thus creates new incentives for each of the groups, which now have common objectives to represent in the negotiations. This results in a convergence of the negotiation goals and positions of group members. In sum, "the common objective strengthens group cohesion" (Castro et al. 2014, p. 111).

Within the UNFCCC, such new incentives are generated in the context of the Annex I – non-Annex I divide. While Annex I membership is linked to costly responsibilities and duties, non-membership is linked to privileges. For non-Annex I members, this created new stakes: the idea that concessions obtained at one point should not be weakened, and thus the incentive to fight for the perpetuation of the status quo (Gupta 2010). The battle for these privileges is fought by the group as a whole since the demand for a change in the status of individual non-Annex I countries is perceived as a threat for many others. Their shared fear is that any weakening of the once-defined dividing line between countries with and without commitments will pave the way for further pressure on more developing countries to take up commitments, and eventually, for a suppression of the principle of common but differentiated responsibilities.

The creation of these new incentives is related to specific topics of the negotiations, particularly those associated with mitigation-related commitments. This leads to two empirical implications, which allow us to test the role of such new incentives. If new incentives are the causal mechanism driving the above hypothesized effect of group membership on the negotiations, then such effect should be stronger for discussions relating to mitigation commitments, than for discussions on other, less divisive issues such as adaptation, capacity building, the technicalities behind GHG reporting, or the organization of the negotiation process itself. In addition, the effect of group membership should be stronger during time periods in which new agreements – which bear the potential of introducing new obligations for a broader set of countries – are being negotiated. This leads us to our second hypothesis:

Hypothesis 2: The effect of group membership is stronger for discussions related to mitigation, and during critical time periods in which new agreements are being negotiated than in discussions and time periods devoted to less critical issues such as adaptation, capacity building, or technicalities (incentives hypothesis).

3.4 *Differential treatment and socialization in groups*

Countries in a given group may meet more often and exchange positions. As they already share some common characteristics, they will feel more closely related. In the words of Mantzavinos et al. (2004, p. 76): "individuals in a given sociocultural environment continually communicate with other individuals while trying to solve their problems. The direct result of this communication is the formation of shared

mental models”, which lead to a common understanding of reality. Through experiments, social psychologists have indeed shown that group discussion increases the chances of cooperation (Orbell et al. 1988). Researchers of intergovernmental organizations have adopted these arguments for explaining strengthening ties between all members of IGOs. They argue that membership in IGOs creates networks between countries, provides communication channels that allow them to share information about interests and intentions, and generates a sense of mutual identity that enhances cooperation (see e.g. Keohane 1986; Caporaso 1992; Russett et al. 1998; Dorussen and Ward 2008). The institutional socialization hypothesis goes even further and suggests that the continuous exchange happening at meetings of IGOs makes member states internalize the norms and rules accepted within that IGO. This process affects their identity over time, thus making their interests converge (Checkel 1999; Johnston 2001; Bearce and Bondanella 2007).

Consequently, this induces a more trustful atmosphere conducive to fruitful deliberations. Castro et al. (2014) posited that such an effect should not only happen for members of an IGO as a whole, but even more so for smaller subgroups. Once a group exists, socialization reinforces cohesion among its members, increasing the likelihood of a unified group position. If, in addition, the group is challenged from the outside, questioning its very foundations and ‘raison d’être’, this may even further weld together its members.

Within the UNFCCC, the Annex I and non-Annex I divide generated two separate fora for discussion in addition to the already existing ones. Since non-Annex I countries enjoy some privileges, their status has been challenged repeatedly in the past. This resulted in a strong response by the group as a whole. In addition, membership to the non-Annex I group of countries is very similar to membership to the G77 and China, a large coalition that has historically represented the views of developing countries in several UN-related fora. It is thus to be expected that members of non-Annex I meet frequently as a group and over time not only develop a common understanding of the issues under negotiation and common positions, but also increase trust and form a group identity within the climate negotiations. A similar effect should also be noticeable for the group of Annex I countries.

Hypothesis 3: The effect of group membership becomes stronger over time as groups develop a common understanding of the negotiation issues, common positions, trust and a common identity (socialization hypothesis).

Both of these causal mechanisms support the more general argument that, once new country groupings have been institutionalized within an IGO, negotiation behaviour of member parties will in turn make such groups more and more pervasive in the discussions. Hence, this leads to a deepening of the differences and disagreements across groups. While Castro et al. (2014) tested the group effect on a sample of climate change negotiations in the period 2007-2009, they were unable to test the two causal mechanisms due to data limitations. Our goal in this paper is thus to use a larger dataset and an improved methodology to be able to test those causal mechanisms, as well as to corroborate the previous finding regarding the ‘constructed peer group’ hypothesis.

4 Data and methods

4.1 Cooperation and conflict in the climate negotiations

Cooperation and conflict are daily features of long-term negotiation processes such as those under the climate change regime. Negotiations encompass many different types of interaction, both verbal and written ones, both public and closed-doors ones. In order to empirically test whether and why Annex I membership affects countries’ negotiation behaviour beyond their own characteristics and related

preferences, we choose a very specific type of interaction between the parties to the UNFCCC: whether a country reacts in a cooperative or conflictive way to another country's oral statements.

The data is obtained from the summaries of all UNFCCC negotiations meetings in the period 1995-2013 as published by the International Institute for Sustainable Development (IISD) in its Earth Negotiations Bulletins (ENBs) (see Codebook in the Appendix). The ENBs provide very detailed daily reports of the negotiations. For all meetings that are open to observers, the reports contain summaries of statements made by the different delegations on behalf of their countries, and of reactions by others. We used these summaries to code how countries interact with each other in the negotiations. We thereby distinguish between cooperative behaviour (speaking on behalf of, supporting, speaking with or agreeing with one another) on the one hand and conflictive behaviour (delaying, opposing or criticizing other's positions or statements) on the other. In addition, we coded the topic or issue area that each interaction is about.

This choice of data source is made on the basis of data availability and data consistency over a long (20-year) time period. While not being full transcripts, the ENBs are the most complete and regular reports of the climate change negotiations. Their independence from any political side and the objective and consistent way in which they are written over the years makes them an excellent source for text coding. However, they do have limitations. They present just a summarized version of the discussions, and it is very difficult to ascertain what is not reported. They mostly cover the meetings that are open to observers. Whenever they cover closed meetings, the statements are not attributed to particular parties. Nonetheless, given their regularity and consistency over time, we deem them to be the best data source available for the type of analysis we intend to carry out.

As an example of our coding of conflictive and cooperative behaviour, an extract of the ENB reporting the negotiations on 3rd November 1999 says: "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 unit of text is coded as 1 in terms of opposition (conflictive behaviour) by China and India towards the EU, and as agreement (cooperative behaviour) between China and India. Its topic is coded as 'mitigation', given that the discussion is about which countries should contribute to the global climate change mitigation effort. We follow this coding scheme for the whole negotiation process between 1995 and 2013, so that we have a variable recording all *negotiation events* in which each country expresses support or opposition towards any of the other countries participating in the negotiations. Our unit of analysis is thus such a negotiation event, characterized by a pair or dyad of interacting countries, the type of interaction (cooperative or conflictive), its topic and the date in which it took place. The dataset covers 61465 of such negotiation events, between 213 countries and coalitions, over the years 1995-2013.

It needs to be noted that the dataset not only includes countries, but also country coalitions – groups of countries that have come together voluntarily in order to exchange information between like-minded countries, to increase their negotiating power by expressing joint positions, and to ease the burden of small or poor countries that may not be able to send a sufficient number of delegates to be represented in all the different negotiation groups for discussing the different policy issues at stake. Some of these coalitions are well-established regional or political country groupings such as the EU, the G77 and China, OPEC or the LDCs that also act as groups in other international fora. There are also regional coalitions such as the African group, the Central Asian and Caucasus group (CACAM) or the Central American Integration group (SICA), and groups formed on ideological grounds such as the Bolivarian Alliance of Latin American Countries (ALBA). Other groups formed on the basis of joint climate-related interests, such as the Alliance of Small Island States (AOSIS), the group of the large emerging countries Brazil, China, India and South Africa (BASIC), the coalition of progressive Latin American countries AILAC (Independence Alliance of Latin American Countries), or the Umbrella group – an alliance of

industrialized countries in favour of market based mechanisms rather than regulation. While a large number of (partially overlapping) groups within non-Annex I, and also a few groups within Annex I exist, only a single (small) group bridges the gap between these two. This is the Environmental Integrity Group (EIG) composed of South Korea, Mexico, Liechtenstein and Switzerland. We treat these coalitions as individual actors who can also act in a cooperative or conflictive manner with all other countries and coalitions.

4.2 The Relational Events Model

To test the hypotheses outlined in Section 3, we apply a Relational Events Model (REM) as proposed by Lerner et al. (2013). In a nutshell, REMs are general 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, p. 11). We define an event⁷ as a “discrete incident that can be located at a single [point in] time (...) and a set of actors” (Schrodt 2012, p. 548), here a dyad of a sender and target. In more formal terms, each event is defined 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 of dyadic interactions are the countries and coalitions involved in the international climate negotiations under the umbrella of the UNFCCC. The type of an event is given by a dummy variable indicating whether an interaction, i.e. negotiation activity, is of cooperative (positive) or conflictive (negative) nature. The time variable captures the date of the negotiation events as precise to a day.

The basic assumption of REMs 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 happened before e_i , therefore, determine the negotiation network G_{ei} .

The goal of this analysis is to investigate the causal mechanisms underlying the forming of the stream of negotiation events by disentangling why actor A negotiates more or less with actor B or why actor A engages in cooperative or conflictive negotiation events. Factors that influence the occurrence and type of events are either exogenous such as actor or dyad covariates, or they emerge endogenously from the structure of previous events. These previous events form a network of past negotiation interactions G_{ei} , i.e. a weighted graph defined as a function of the past sequence of negotiation activities. In consequence, the event network is dependent and independent variable at same time. It is dependent variable, as we aim to explain the type and frequency of events. It is independent variable, as we use network dependencies to do so (Brandes et al. 2009).

4.3 Regression models

From the above very general description⁸ of the model follows that the probability of events is decomposed into two components: a type function that models the conditional probability of cooperative or conflictive negotiation events, i.e. the event type, given that interaction occurs, and a rate function that models the frequency of events of any type (negotiation interactions between the same or other dyads of countries and coalitions). In our case, the dependent variable for the type function is the dummy indicating whether the current interaction is cooperative (1) or conflictive (0), while the dependent variable for the rate function is just the sequence of interactions over time.

⁷ Compare Schrodt (1994) for an overview about the discussion of the definition about the event term.

⁸ Compare Brandes et al. (2009) and Lerner et al. (2013) for a more detailed and formal description of the model.

In more formal terms, the type function models the conditional probability that an event has type w_e given that the next event involves a_e as sender and b_e as target at time t_e with a vector of type parameters $\theta^\mu = \theta_1^\mu, \dots, \theta_n^\mu$, which stochastically determine the event type.

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

The rate function is the probability density of the event e_i at time t_e involving a_e as sender and b_e as target and $\theta^\lambda = \theta_1^\lambda, \dots, \theta_n^\lambda$ being a vector of rate parameters that stochastically determine the event frequency.

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

Estimated model parameters reflect what factors trigger an increase in the likelihood that a specific interaction occurs (type parameters, θ^μ) and which ones cause an increase or decrease in the frequency of interaction (rate parameters, θ^λ). Type parameters are estimated with a logit model based on maximum likelihood estimation. Positive, significant parameter estimates indicate an increased likelihood of a cooperative negotiation event, whereas negative, significant parameter estimates indicate decreased likelihood of a cooperative negotiation event. Rate parameters are estimated with a survival regression model. Rate parameter estimates reflect the effect of the associated variable on the survival time of an event until the next event occurs. Positive, significant parameter estimates indicate an increased survival time of an event meaning a decreased event frequency (negative effect). Negative, significant parameter estimates indicate decreased the survival time; thus an event occurs at a faster rate (positive effect).

4.4 Network statistics

While the sequence of negotiation events (rate model) and the event type (type model) are used as dependent variables, network statistics that reflect endogenous patterns of interactions between negotiation partners serve as explanatory variables along with exogenous actor and dyadic covariates. Network statistics are calculated for each event in the event sequence based on the network of past negotiation events and thus reflect network dependencies. We included in our model several network statistics that capture important network dependencies such as reciprocity, structural balance, degree effects, and structural equivalence. This enables us to test for the above outlined incentives and socialization hypotheses, while controlling for other vital patterns and rules of negotiation behaviour.

The simplest network dependency is captured by the *social inertia* network statistic (Lerner et al. 2013). The statistic measures the tendency of actors to behave in the same way as they did in the past. In our model, we control for this effect by using a typed version that captures the inertia of cooperative or conflictive negotiation events. In the type model, a significant, positive inertia parameter indicates that past cooperative events between actors A and B increase the likelihood of cooperative events between A and B in the future. In the rate model, it is about the frequency of events. Thus, a significant, negative parameter indicates that repeated cooperative interactions between A and B increase the frequency of (any type of) events between the same pair of sender and target.

Reciprocity captures the tendency of actors to reciprocate social behaviour (Lerner et al. 2013). Thus, actor A reacts to actor B in the same way as actor B has treated actor A in the past. In other words, when actor A supported actor B in past negotiation events, actor B supports actor A in the future. In our model, we control for this effect by using a typed version of reciprocity that captures the reciprocation of cooperative negotiation events. In the type model, a significant, positive reciprocity parameter indicates that reciprocating cooperative events increases the likelihood of cooperative events in the future. In the

rate model, a negative, significant parameter indicates that reciprocation increases the frequency of events between the same pair of sender and target.

As predicted by structural balance theory (Wasserman and Faust 1994, p. 220ff), the relationship between two social actors A and B depends on common friends and enemies. A set of actors is considered as structurally balanced when they show consistent behaviour towards all actors in the group. Hence, they are expected to be friends with the friends of friends and enemies with the enemies of friends. In this analysis, two actors 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 conflictive negotiation events. According to structural balance theory this means that actors behave cooperatively towards the friends of friends, conflictively towards the friends of their enemies and the enemies of their friends, and cooperatively towards the enemies of their enemies. In our model, these network dependencies are represented by four *triad statistics* that measure whether events have a tendency to form closing triads with the friends of friends, the friends of enemies, the enemies of friends, and the enemies of enemies, thus for each of the four possible balanced situations. In the type model, a positive, significant parameter associated with the friends of friends and enemy of enemy statistics implies that the friends of friends and enemies of enemies have a greater likelihood to be involved in cooperative negotiation interactions. On the other hand, a negative, significant parameter associated with the friends of enemy and enemy of friends statistics points to a smaller likelihood of cooperative negotiation interaction between the friends of enemies and enemies of friends. In the rate model, a negative, significant friends of friends and enemy of enemy parameter implies that such events occur with greater frequency over time. Conversely, a positive, significant parameter associated with the enemy of friends and friends of enemy statistics means a decreased frequency of these kinds of interactions.

Countries and coalitions behave differently in the negotiation process, thus they take in different roles and hold different positions. The term position refers here to a set of social actors, which are similarly embedded in a network of relations, whereas the term role refers to the patterns of relations between social actors. Thus, actors who are similar in their social activity towards other actors hold a similar position and are thus structurally equivalent (Wasserman and Faust 1994, p. 348). In our analysis, some countries and coalitions are more active with respect to initiating negotiation events, others are more often targeted. To control and test for these differences we use a set of four statistics, i.e. *sender outdegree* (activity), *sender indegree* (popularity), *target outdegree* (activity), and *target indegree* (popularity) (Lerner et al. 2013). In general, all these statistics measure whether events have the tendency to include the same sender or target over the entire event sequence. The sender outdegree statistic measures the activity of an actor as sender, hence how often the current sender was involved as a sender in past events. In the type model, a significant, positive parameter estimate implies that senders that initiate many events more likely initiate cooperative events in the future. In the rate model, a negative, significant parameter points to an active sender becoming even more active over time. The sender indegree statistic measures how often the current sender was targeted by other senders in the past. In the type model, a significant, positive parameter estimate means that being active is rewarded by other active senders with cooperative interactions. In the rate model, a significant, negative parameter estimate points to an increased frequency of these kinds of events. Thus, being active as a sender increases the general popularity among other senders over time. The target indegree statistic measures the popularity of targets, hence how often the current target was targeted by senders in the past. In the type model, a significant, positive parameter estimate means that being a popular target increases the likelihood of being involved in cooperative events by other senders in the future. In the rate model, a significant, negative parameter estimate indicates that being targeted increases the frequency of being a target in future events. Finally, the target outdegree statistic measures how often a current target acted as a sender in past events. In the type model, a significant, positive parameter estimate implies that being an active sender increases the likelihood of

being targeted cooperatively by others in the future. In the rate model, a significant, negative effect indicates that being an active sender increases the popularity of an actor as target.

A final set of network statistics measures the tendency of senders to adapt to the behavior of their peers. These statistics are conceptually linked to the degree statistics but more strongly focus on the aspect of clustered behaviour. *Sender similarity* measures how many targets the current sender has in common with other senders that targeted the current target in the past. In other words, how likely two senders show the same pattern of behaviour towards the same set of targets. In the type function, a significant, positive parameter estimate points to an increased likelihood of senders to initiate cooperation towards the same set of targets. In other words, there is a tendency of senders to cluster together or inhibit the same behaviour towards the same set of targets. In the rate model, a significant, negative parameter estimate means that there is a general tendency of senders to target the same set of targets. For the negotiation process, this implies that countries more and more direct their negotiation activities to the same negotiation partners. *Target similarity*, on the other hand, measures the tendency of targets to be commonly addressed by senders, thus how likely is it that two targets are addressed by the same actor. Analogous to sender similarity, this statistics measures the tendency of clustered interactions, however now from the perspective of the target. In the type model, a significant, positive parameter suggests that there is an increased likelihood of the targets to be commonly addressed by cooperative interactions initiated by same sender. In the rate model, a significant, negative parameter points to an increased frequency of events in which the same targets are addressed by the same actor. Similar to the sender similarity statistic, this effect captures clustering tendencies in the negotiation process.

4.5 Other explanatory and control variables and hypothesis testing

The group effect hypothesis posits that the members of the same constructed group are more likely to behave cooperatively towards each other in the negotiations. Here, our central explanatory variable is a dummy that takes the value of 1 when both countries in the dyad belong to the same group (Annex I or non-Annex I) and 0 if they do not. If the group effect hypothesis is correct, we expect the variable *same annex* to have a positive and significant effect on cooperation in the type model, after controlling for all other country, dyad and network characteristics that may affect cooperation as well.⁹

The second, incentives hypothesis posits that the group effect should be stronger in discussions about topics related to the new incentives created by the groups. We therefore expect the group effect to be stronger for:

- (1) discussions relating to mitigation commitments, and
- (2) those critical time periods in which new agreements are being negotiated. Such agreements bear the possibility of introducing new commitments for a broader set of countries and thus breaking the Annex I / non-Annex I division.

⁹ As robustness checks, we tested several versions of this *same annex* variable. First, we varied the way in which we classified all interactions in which the Environmental Integrity Group (EIG) was involved. As explained before, this is the only coalition that has members among both Annex I and non-Annex I. So, in our preferred version of the *same annex* variable we treated all interactions with EIG as if they were interactions with a member of the same Annex (so they all took the value of 1). But we also tested a variable in which the interactions with EIG were classified into a third category (0.5), and a variable in which they were classified as not being with members of the same annex (0). In addition, we looked separately at common membership between Annex I and common membership between non-Annex I, given that countries within non-Annex I are much more heterogeneous than those within Annex I, which could lead to different negotiation behaviour within both groups. In this version, we had three categories, with 0 when both countries in the dyad were in a different annex, 1 when they were members of non-Annex I, and 2 when both were members of Annex I. In this case, interactions with EIG were coded as being either between two non-Annex I or between two Annex I countries.

To test this hypothesis, we thus introduce two further explanatory variables. The variable *mitigation* is a dummy that takes the value of 1 if the current negotiation event is about emission reduction commitments, and 0 otherwise.¹⁰ The variable *critical period* is a dummy that takes the value of 1 for all negotiation events that took place in the periods 1995-1997 and 2007-2013, and 0 for those that took place in the period 1998-2006. During 1995-1997 the negotiations that led to the adoption of the Kyoto Protocol, which introduced binding mitigation-related commitments for the first time, took place. During these discussions, parties repeatedly debated issues relating to how the burden of mitigation should be distributed across parties, whether and how developing countries should contribute to mitigation, or whether and how individual parties could adopt voluntary commitments, which would have been another way of allowing developing countries to participate in mitigation. In 2007-2012 parties negotiated the post-2012 climate regime, including a second commitment period for the Kyoto Protocol (thus, new targets for the existing Annex I countries), but also a possible second protocol that would introduce mitigation commitments and actions for a broader set of countries. Then, from 2013 onwards, parties negotiated the post-2020 regime, which culminated in December 2015 with the adoption of the Paris Agreement that establishes mitigation contributions by all parties. Hence, these time periods represent those critical times in which the discussions regarding commitments, and thus the distribution of costs and benefits between Annex I and non-Annex I countries, were most salient.

To test the incentives hypothesis, we use interactions between the variables *same annex* and *mitigation* and between *same annex* and *critical period*. If the effect of *same annex* on cooperation (in the type model) is stronger when *mitigation* and *critical period* take the value of 1, then we can support the hypothesis.

The third, socialization hypothesis, argues that the group effect becomes steadily stronger over time, as the countries within each group develop a common understanding of the negotiation issues, common positions, trust and a common identity. To test this hypothesis, we turn to the rate model, which models the frequency of interaction, and use subsamples to assess what affects the frequency of cooperative or of conflictive interactions.

Remember that in the rate model parameter estimates tell us something about the survival time of an event. Using the whole sample, a positive, significant parameter indicates decreased frequency of (cooperative and conflictive) interaction (increased survival time) and a negative, significant parameter implies increased frequency of interaction (decreased survival time). However, we need to test whether membership to the same annex increased the frequency of cooperative interaction and decreased the frequency of conflictive interaction over time. That is why we run the regressions first on a subsample including only the cooperative interactions (51297 observations), and then on a subsample including only the conflictive interactions (10168 observations). We again use out *same annex* variable to test the effect of being in the same annex on how the frequency of cooperative interactions or the frequency of conflictive interactions developed over time. For our hypothesis to be supported, we expect a negative and significant coefficient on *same annex* in the regressions on the cooperative interactions, and a positive and significant coefficient on *same annex* in the regressions on the conflictive interactions.

Because taking such subsamples goes against the idea that the emergence of new events in the events sequence is dependent on past interactions, we also report the results of the rate model on the whole event sequence including both cooperative and conflictive interaction. In this case, with the full sample, we run an additional test of the socialization hypothesis by looking at the interaction between *same annex* and *cooperation*. Here, a negative sign on the coefficient for the interaction would indicate that interactions

¹⁰ We also tested an alternative variable, *critical topic*, which not only includes mitigation, but also discussions relating to the principles of the Convention (i.e. the principle of common but differentiated responsibilities that underlies the differential treatment), and discussions relating to what should be included in new agreements. The effects, while somewhat weaker, do not change substantially.

between a country dyad become more often over time when they are in the same annex and cooperate. The expectation in this case is not straightforward. If countries in the same annex tend to have the same opinions, they may tend to interact more over time to show such agreement. But they may also believe that it is superfluous to express a similar opinion again if it has already been voiced by someone else.

To test our hypotheses, it is crucial to control for all relevant country and dyad characteristics in the models, because countries that are intrinsically similar – e.g. in terms of how much GHG they emit, or how rich they are – will adopt similar positions in the negotiations. Also, countries that are more generally friendly towards one another – because of economic, political or historical ties –, may also be more likely to cooperate in the climate change negotiations. The group hypothesis states that group membership affects negotiation behaviour beyond these intrinsic similarities. Fortunately, the countries within each of the groups are not homogeneous, and their characteristics also vary over time. This allows us to separate the effect of group construction from the effect of countries' characteristics and related preferences.

As controls we take a similar set of variables than those chosen by Castro et al. (Castro et al. 2014) to be relevant. The most important controls 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 entails that countries with better capabilities (income) and with a stronger responsibility for climate change (emissions) should lead the effort of combatting climate change (Gupta 2010). *Income* is expressed in terms of GDP per capita (in constant international dollars). For emissions, we try two specifications, *total GHG emissions* and *GHG emissions per capita*, as there are different theoretical arguments regarding which of these two measures should be used (see e.g. Ott et al. 2004; Karousakis et al. 2008). As our units are not single countries but country dyads, for each of these variables we either include a control for the sender and one for the target, or a version that measures how different the sender and the target are, which is given by the absolute difference between the respective sender and target values. We also try both, absolute and logged versions of these variables in different specifications.

In addition, country size (in terms of *population*) is used to capture the role of country power resources in influencing the negotiations (Snyder and Diesing 1977; Keohane and Nye 1989). Dummy variables indicating whether the country's national or official language is *English* or *French* are included to model the delegation's negotiation skills (Mastenbroek 1991), as language is frequently considered a barrier for communication and understanding during these technically complex climate negotiations.¹¹ These variables are all included separately for the sender and the target, and for the population variable we again test versions in absolute and in logged values. The network indegree and outdegree statistics described above, in addition, more directly measure how active a country has been in the negotiations, which of course can affect how often other countries interact in a cooperative or conflictive manner with it.

A measure of political freedom (*democracy*) is used to control for the possible effect of ideological influences on country positions and behaviour in the negotiations.

Two indicators of vulnerability to climate change (the relevance of income from *agriculture* as % of GDP and the average percentage of population annually affected by natural disasters related to droughts, floods and extreme temperatures between 1990 and 2009 (*vulnerability*)), as well as characteristics related to potential benefits from specific areas under discussion (such as the use of *forests* as sinks and the relevance of *fossil fuel-related rents* as % of GDP) are also included to control for issue-specific interests of parties.¹²

¹¹ An additional control for secondary enrollment rates, as a measure of the level of education of the country that would also proxy the skills of its delegation was also tried out, but it was never found to be significant (likely due to its high correlation with income levels) and thus excluded from the specifications shown here.

¹² Controls for the share of land area with elevation below 5 m.a.s.l. as an additional measure of vulnerability and for access to electricity as an additional issue-specific interest were also tested, but found to be never significant.

We in addition control for a set of variables related to the UNFCCC process (these are in addition to those included in the original Castro et al. article): we add a dummy that controls for those interactions that happen between a coalition and one of its members. If, for example, Tuvalu supports a statement made by the coalition of the small island states (AOSIS), we code the variable *coalition member* as 1. It is to be expected that such interactions are generally more cooperative. We also add a dummy that controls for interactions between two countries that are members of the *same coalition*.¹³ And finally, we add dummies that indicate whether the target and the sender countries are – at the time of the respective interaction – actual *parties* to the Convention and the Protocol. While non-parties can sometimes participate as observers and provide their views, it is to be expected that parties are more active in the negotiations.

Finally, we consider the role of several types of bilateral ties among our dyads: *trade* and *aid* flows, being located in the *same region*.¹⁴ Given that there is no data available for foreign direct investment (FDI) flows among our whole dataset, we just control separately for the sender’s and the target’s incoming *FDI*.

If not otherwise indicated, all variables are measured for each year between 1995 and 2013, and either for both the sender and the target, or as the absolute difference between them. The variables *trade* and *aid* are coded as total flows between the dyad, and the variables *same region* and *same coalition* are coded as similarity: they take the value of 1 if both countries in the dyad belong to the same geographical region or negotiation coalition, otherwise they take the value of 0. For a more detailed description of all variables, their descriptive statistics and data sources, and a correlation table, see Tables A1 and A2 in the Appendix.

Since country coalitions are included as single observations in addition to individual countries, we generate values for the respective variables by using the averages of their member countries. In the case of population, which is included to represent power, we use the sum rather than the average to reflect the overall size of the coalition. In the case of English or French language, we use the mode.

We made an effort to have as complete data as possible, bearing in mind that our dataset includes small countries for which this is usually difficult. For this reason, for several variables we replaced missing values by linear imputation using related indicators from alternative data sources. After accounting for the remaining missing values, our total sample covers 50975 observations.

5 Results

5.1 *The climate negotiations network*

To visually and descriptively explore the negotiation event network, we subset the event sequence into four distinct time periods. Next, we produced network graphs with ties reflecting all cooperative and conflicting relations between the actors (countries and coalitions) involved in the negotiation process. To disentangle the interactions between the main actors in the climate negotiations, we dichotomized the networks of each period at the cut-off point with the highest correlation to the non-dichotomized version of the respective network. The created networks represent the following periods:

- 1995-1997: the negotiations that culminated in the adoption of the Kyoto Protocol

¹³ 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 same annex remained, even though it became weaker.

¹⁴ We also (or alternatively) tried controls for colonial relationship and geographic distance, but they were either non-significant or their fit was worse than for the variables shown here, or we lacked an appropriate summary value for the country coalitions. The same happened to a control for political similarity in UN general assembly votes: given the nature of that variable, it was not possible to generate values for the coalitions, so we decided to drop that control. Including all these variables, however, does not affect our substantive results.

- 1998-2006: negotiations mostly on Kyoto Protocol implementation
- 2007-2009: negotiations on new post-2012 agreement and second commitment period for the Kyoto Protocol, which culminated in the (failed) Copenhagen meeting
- 2010-2013: finalization of post-2012 negotiations and beginning of post-2020 negotiations.

Figures 1-4 show the networks of only cooperative ties among the most important actors in these four time periods, with the nodes indicating the countries or coalitions, and ties indicating the interactions between them. Members of Annex I are depicted in green squares, while members of non-Annex I are in blue. The size of the squares reflects the actors' indegree or popularity level. The ties indicate which actors often interact with each other in a cooperative way during the relevant time period, and the arrows show the direction of the cooperative interactions. The graphs and calculations were done in UCINET and NETDRAW (Borgatti et al. 2002).

During the period 1995-97, the most popular actors are the US, EU, China and the G77/China. The network shows a clear separation between most Annex I and non-Annex I countries. Cooperative ties exist mostly between Annex I or between non-Annex I countries, with only relatively few ties going across the groups. Interestingly, however, AOSIS – a coalition representing the small island developing states, a group of countries that are very vulnerable to climate change – seems to cooperate almost exclusively with Annex I countries. It seems that, from the early negotiations on, AOSIS adopted positions that were quite in contrast with those of the bulk of G77/China members. Indeed, AOSIS advocated from the start for a broader and more stringent mitigation agreement, a notion that most other developing countries opposed.

The most salient characteristic of the 1998-2006 network is the relatively low activity level of members from the non-Annex I group. In this period the detailed technicalities of the Kyoto Protocol implementation were discussed, so it is likely that many developing countries, lacking sufficient technical capacity, were relatively passive. Moreover, while Annex I countries cooperate frequently with each other, the cooperation across both groups is very limited. AOSIS again is separated from the rest of the non-Annex I actors, and rather cooperates with the EU than with the other developing countries.

In the period 2007-2009, we again observe that both groups are quite separate, with the EU being the key player that engages in cooperation with actors from both sides. From the first to the third network, it seems that the number of cooperative ties across the two groups tends to decrease. This would support our idea that over time, the members of each group developed a common understanding and identity that made the groups more cohesive – while at the same time highlighting the differences across them.

In the period from 2010 onwards the picture looks messier. While the group of Annex I countries remains quite closely knit, we find non-Annex I actors on both sides of the Annex I cluster. The number of non-Annex I actors involved in cooperative interactions with Annex I actors has increased, and the non-Annex I group of countries seems to have divided into two poles. The G77/China is no longer that relevant as a voice for the developing countries. Instead, individual countries such as China and India and smaller coalitions like AOSIS have gained prominence. All of this is in line with the fragmentation of the G77/China group of countries observed by experts of the climate negotiations after the Copenhagen debacle. While a core group of developing countries continued to strongly support the old paradigm of strictly separated obligations for developing and industrialized countries, more progressive developing countries within AOSIS and Latin America started to advocate for broader cooperation in mitigation. In this last period, socialization does not seem to play such a strong role any more, probably because there are more differentiated incentives for different subgroups of developing or non-Annex I countries.

Figure 1: Cooperative network in period 1995-1997 (main actors only)¹⁵

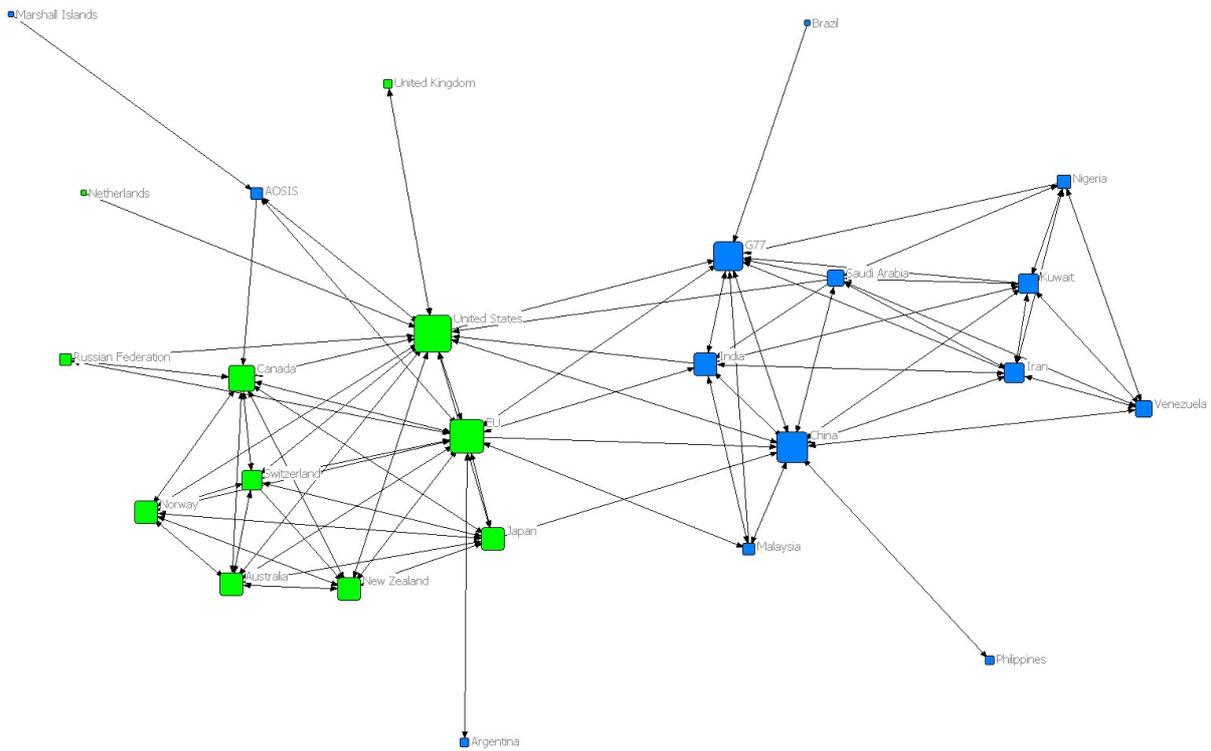
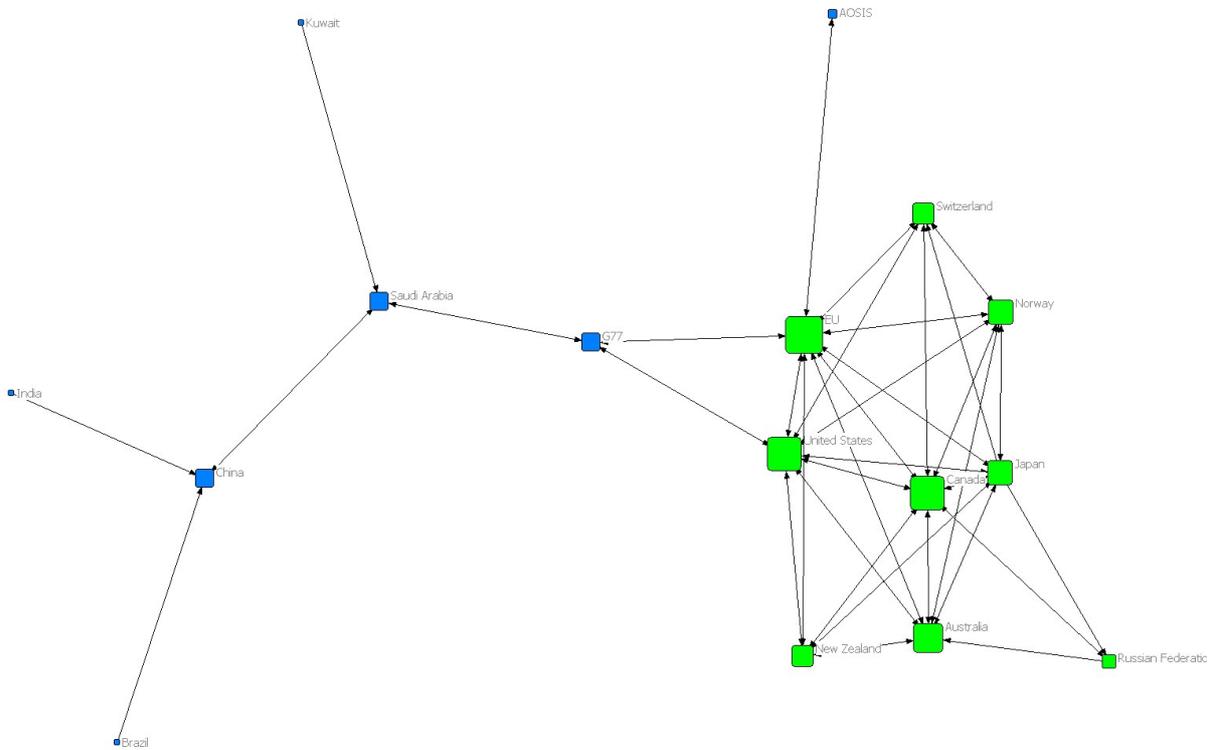


Figure 2: Cooperative network in period 1998-2006 (main actors only)¹⁶



¹⁵ We used a cut-off value of 11 (best fit, $r = 0.74$) for the dichotomization of the original cooperation network in time period 1. Thus, a tie means that two actors cooperated more than eleven times during this time period.

¹⁶ We used a cut-off value of 24 ($r = 0.80$) for the dichotomization of the original cooperation network in time period 2. Thus, a tie means that two actors cooperated more than 24 times during this time period.

Figure 3: Cooperative network in period 2007-2009 (main actors only)¹⁷

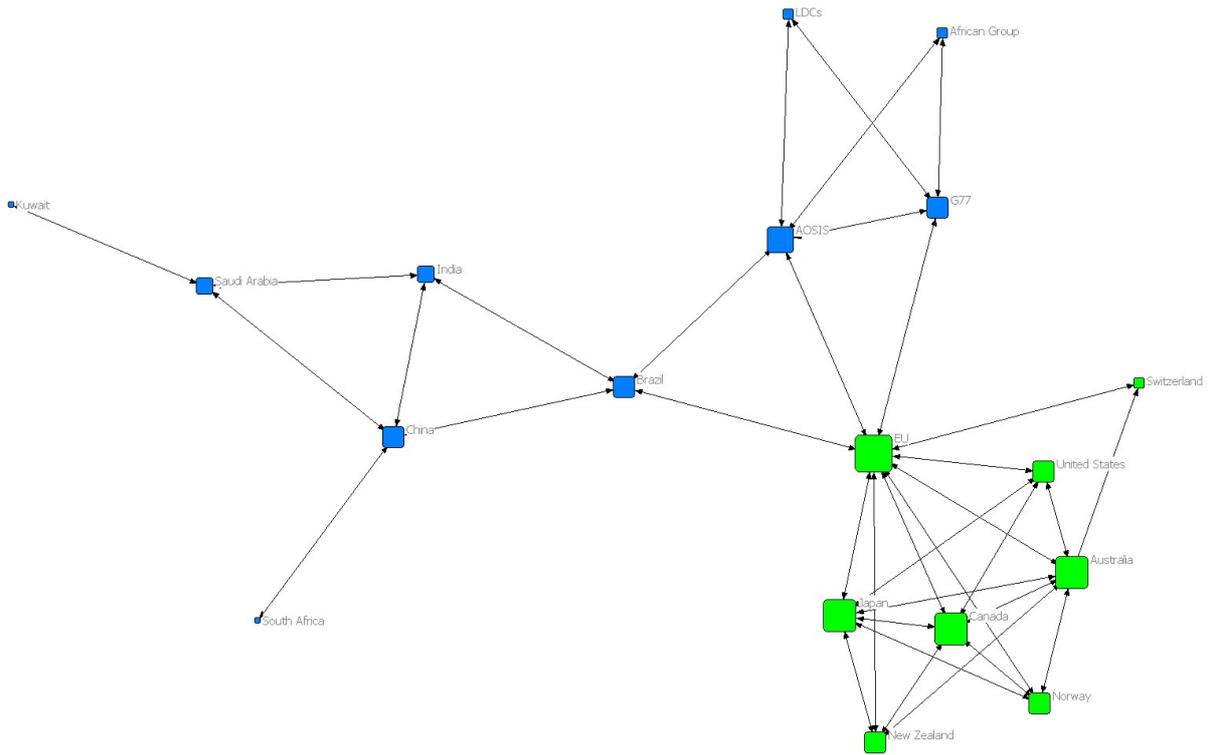
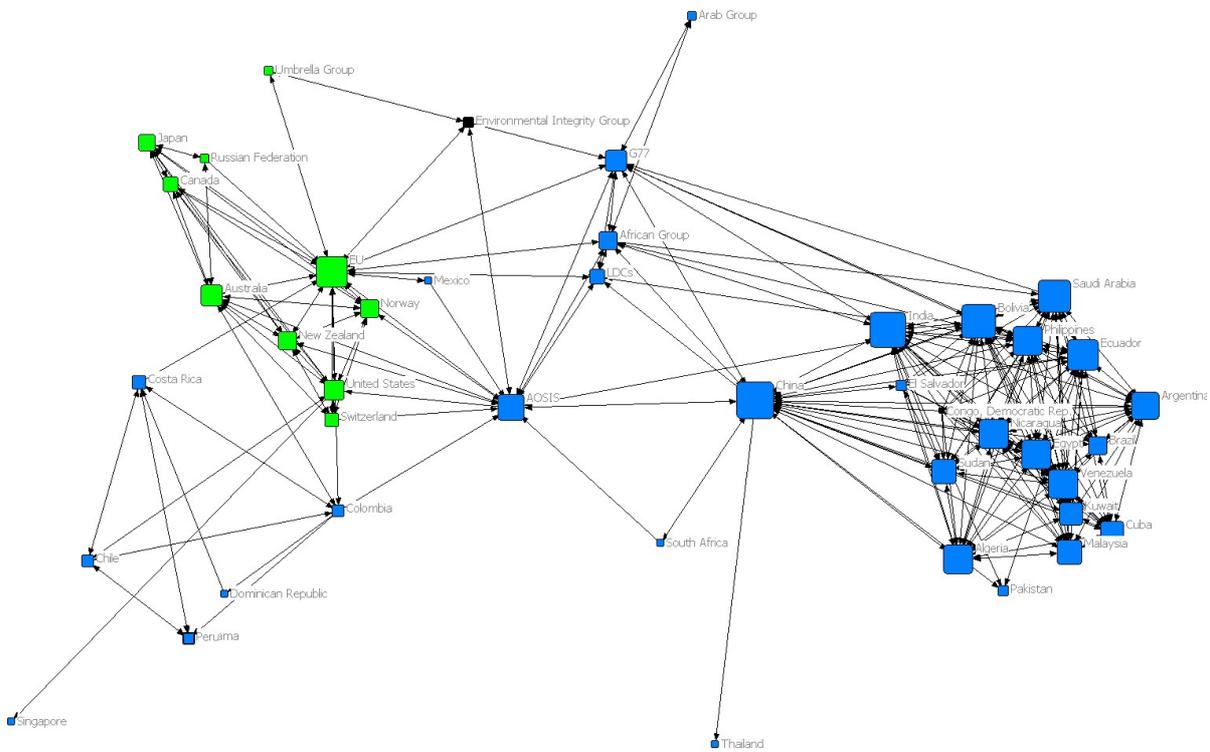


Figure 4: Cooperative network in period 2010-2013 (main actors only)¹⁸



¹⁷ We used a cut-off value of 19 ($r = 0.80$) for the dichotomization of the original cooperation network in time period 3. Thus, a tie means that two actors cooperated more than 19 times during this time period.

¹⁸ We used a cut-off value of 11 ($r = 0.80$) for the dichotomization of the original cooperation network in time period 4. Thus, a tie means that two actors cooperated more than eleven times during this time period.

5.2 Results from the type model: group and incentives effects

Table 1 presents the results from the type regressions, which model the likelihood that the interaction between the respective dyad is cooperative. We estimated our models using the “rem” package implemented in R (Brandenberger 2016).

In all our models, we find a consistently positive and significant effect of the *same annex* variable, which indicates that countries belonging to the same annex to the Convention (i.e. Annex I or non-Annex I) tend to be more cooperative towards each other than towards countries that are not in the same annex. This finding strongly supports our hypothesis 1 on the group effect. In Model 5, we show a regression in which we use separate categories for being in Annex I and in non-Annex I. Here we again see a positive effect for both groups, but the effect is larger for the group of non-Annex I countries. It thus seems that, despite their larger heterogeneity, non-Annex I countries tend to act more cooperatively towards one another than Annex I countries. This is possibly due to the internal divide within the Annex I group into climate policy frontrunners like Europe and laggards like the US.

With respect to the control variables, we find that the target population has a significant negative effect on the likelihood of cooperative interactions, which means that smaller countries tend to be treated more cooperatively (as targets). The sender population is however never significant, which means that size (our proxy for power) does not appear to influence how cooperatively a country behaves during the negotiations.

Countries that are more different in terms of total GHG emissions, democracy, and rents obtained from the production of fossil fuels tend to negotiate in a less cooperative manner with each other. Considering that these countries have different interests in the negotiations, this is not surprising. We do not find significant effects for the differences in income, per capita emissions or forest cover. The first two variables are highly correlated with other variables in the model, but we chose to keep them in the model due to their theoretical importance. The forest-related interests do not seem to play such a controversial role in the negotiations. Interestingly, countries that are more different in terms of vulnerability tend to negotiate in a more cooperative manner with each other. It seems that vulnerable countries are addressed in a more positive manner, and that they themselves tend to be more cooperative probably as a strategy to get more favourable outcomes.

Countries that are more different in terms of their openness towards external FDI tend to be more cooperative with each other, but this effect is not very robust. In contrast, the dyadic trade flows do not seem to affect how countries behave in the climate negotiations. But interestingly, larger development aid flows seem to be negatively related to how cooperatively countries behave in the negotiations. This may be due to the fact that the largest aid flows move from the North to the South (even though our dataset includes aid from emerging donors). It thus seems that the aid flows variable reflects the differences between Southern non-Annex I and Northern Annex I countries. As expected, being in the same region and belonging to the same negotiation coalition increase the likelihood that countries behave cooperatively towards each other. Similarly, interactions between a coalition and one of its members tend to be more cooperative.

Finally, having English as an official language decreases the likelihood that countries behave (as senders) or are treated (as targets) cooperatively. Given that having good English skills is also an important resource that increases delegates’ comparative advantage in the negotiations, this effect is not surprising. In contrast, having French as an official language did not have a significant effect in any of the tested models, and has thus been excluded from the results shown here. Being a party to the Convention and the Protocol increases the likelihood that countries are treated cooperatively.

Table 1: Results from the type model

	<i>Logit regressions on: cooperative interaction</i>				
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
<i>Network statistics</i>					
Sender outdegree	0.58 (0.22)**	0.62 (0.22)**	0.65 (0.22)**	0.54 (0.22)*	0.93 (0.22)***
Target indegree	0.57 (0.21)**	0.63 (0.21)**	0.68 (0.22)**	0.53 (0.21)*	0.98 (0.22)***
Reciprocity	76.32 (4.06)***	77.90 (4.08)***	77.37 (4.08)***	76.39 (4.06)***	76.77 (4.03)***
Triad	-24.80 (1.13)***	-24.77 (1.13)***	-24.41 (1.13)***	-24.02 (1.14)***	-22.50 (1.16)***
Sender similarity	0.26 (0.04)***	0.25 (0.04)***	0.25 (0.04)***	0.26 (0.04)***	0.20 (0.04)***
Target similarity	0.14 (0.04)***	0.13 (0.04)***	0.12 (0.04)**	0.13 (0.04)***	0.06 (0.04)
<i>Main independent variable and interactions</i>					
Same annex	1.34 (0.04)***	2.32 (0.08)***	2.32 (0.07)***	1.43 (0.04)***	
Both non-Annex I					2.84 (0.08)***
Both Annex I					1.08 (0.09)***
Mitigation		-0.49 (0.05)***			
Same annex * Mitigation		1.18 (0.08)***			
Critical topic			-0.46 (0.04)***		-0.47 (0.04)***
Same annex * Critical topic			1.26 (0.07)***		
Both non-Annex I * Critical topic					1.71 (0.09)***
Both Annex I * Critical topic					0.15 (0.10)
Critical period				-0.04 (0.04)	
Same annex * Critical period				0.28 (0.06)***	
<i>Control variables</i>					
Sender population (log)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)
Target population (log)	-0.03 (0.01)***	-0.03 (0.01)***	-0.03 (0.01)***	-0.03 (0.01)***	-0.04 (0.01)***
Income difference (log)	-0.02 (0.03)	-0.02 (0.03)	-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.03)
GHG emissions difference (log)	-0.03 (0.01)***	-0.03 (0.01)***	-0.04 (0.01)***	-0.03 (0.01)***	-0.04 (0.01)***
GHG per capita difference (log)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)	0.01 (0.02)
Democracy difference	-0.12 (0.01)***	-0.13 (0.01)***	-0.13 (0.01)***	-0.12 (0.01)***	-0.13 (0.01)***
Agriculture difference	0.01 (0.00)*	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Vulnerability difference	0.05 (0.01)***	0.05 (0.01)***	0.05 (0.01)***	0.04 (0.01)***	0.04 (0.01)***
Forest difference	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Fossil rents difference	-0.01 (0.00)***	-0.01 (0.00)***	-0.01 (0.00)***	-0.01 (0.00)***	-0.02 (0.00)***
FDI difference	0.01 (0.00)*	0.01 (0.00)	0.01 (0.00)*	0.01 (0.00)*	0.01 (0.01)*
Trade flows (log)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)*
Aid flows (log)	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***	-0.02 (0.00)***
Same region	0.25 (0.04)***	0.24 (0.04)***	0.25 (0.04)***	0.25 (0.04)***	0.25 (0.04)***
Same coalition	1.31 (0.06)***	1.30 (0.06)***	1.29 (0.06)***	1.31 (0.06)***	1.35 (0.06)***
Coalition member	0.83 (0.11)***	0.85 (0.11)***	0.83 (0.11)***	0.83 (0.11)***	0.78 (0.11)***
English sender	-0.16 (0.03)***	-0.18 (0.03)***	-0.18 (0.03)***	-0.16 (0.03)***	-0.19 (0.03)***
English target	-0.08 (0.03)*	-0.09 (0.03)*	-0.09 (0.03)**	-0.08 (0.03)*	-0.10 (0.04)**
Sender is a party	-0.03 (0.05)	-0.02 (0.05)	-0.03 (0.05)	-0.05 (0.05)	-0.04 (0.05)
Target is a party	0.14 (0.05)**	0.15 (0.05)**	0.14 (0.05)**	0.13 (0.05)*	0.12 (0.05)*
AIC	35038.11	34796.50	34698.14	35017.83	34465.79
BIC	35285.61	35061.68	34963.31	35283.00	34748.64
Log Likelihood	-17491.06	-17368.25	-17319.07	-17478.92	-17200.89
Observations	50975	50975	50975	50975	50975

The direction of the effects of the control variables is thus mostly in line with our expectations, and supports our confidence that we are controlling for relevant aspects of the negotiations.

With respect to the network statistics, countries that are more active in the negotiations (as indicated by the sender outdegree statistic) and countries that are more popular as targets (target indegree statistics) tend to negotiate in a more cooperative manner.¹⁹ This result is somewhat surprising, as the countries that

¹⁹ The other degree statistics were never significant in our models due to the high correlation between indegree and outdegree statistics, and are thus not further discussed here.

participate more in the negotiations are those with better bargaining skills and resources, and would thus be expected to use this power to bargain in a harder way and so try to obtain their desired outcomes.

As expected, the significant and positive coefficient for reciprocity indicates that reciprocating cooperative events increases the likelihood of cooperative events in the future. Table 1 does not show results for the inertia statistic. Reciprocity and inertia are highly correlated as they measure very similar phenomena. In our models, including both led to a high variance inflation factor (VIF) and to unstable estimations for some of the other network statistics. When including only inertia in the models, its coefficient was also always positive and significant, indicating that past cooperative events between both actors in the dyad increase the likelihood of cooperative events between them in the future. Given that the model fit of the regressions with reciprocity was always higher than that of the models with inertia, we only show the first ones here. All other results were not affected by selecting one or the other variable.

The negative coefficient on the triad statistic indicates that the more an actor interacts with a third actor that is also related to its counterpart in the dyad, the less it tends to cooperate with this counterpart. Put differently, clustering among countries in the negotiations tends to reduce the likelihood of cooperation.²⁰

Finally, the target and the sender similarity have significant and positive effects in the type model, suggesting that there is an increased likelihood of similar targets to be treated cooperatively by the same sender, and that similar senders are more likely to initiate cooperation with the same target.

Models 2 to 5 in Table 1 show our tests for our hypothesis 2 on the creation of new incentives. In Model 2 we see that when the discussions are about the topic mitigation, the interactions tend to be less cooperative. Given that the stringency and allocation of mitigation targets is a very controversial topic, such a negative effect is expected. However, we also see that the interaction between being in the same annex and the topic mitigation has a positive effect: when the discussions are about mitigation, the positive effect of being in the same group (Annex I or non-Annex I) on cooperative behaviour becomes stronger. This finding supports our hypothesis 2: the effect of being in Annex I or non-Annex I is linked to the new incentives generated by the costly mitigation obligations introduced by the regime.

Model 3 displays very similar results for our alternative variable *critical topic*: while the interactions tend to be less cooperative when parties discuss the critical topics (mitigation, new agreements or principles of the Convention), the positive effect of being in the same annex on cooperative behaviour is stronger during these critical discussions. Model 4 runs the test for the periods of time in which new agreements are being negotiated, and again, while the main effect of these discussions on cooperativeness is non-significant, the interaction with being in the same annex has a positive and strongly significant effect. Model 5, finally, tests the interactions between critical topic and the separate non-Annex I and Annex I categories. Interestingly, while the interaction is as expected positive and significant when both countries in the dyad belong to non-Annex I, it is insignificant when they both belong to Annex I. While the results support the incentives hypothesis, it seems that these incentives are stronger for the group of non-Annex I countries that enjoy the privilege of not having emission reduction obligations and of receiving financial and technical support.

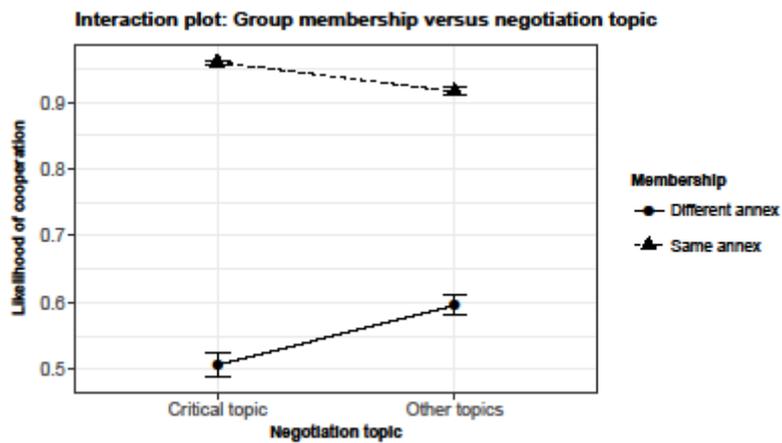
Figure 5 more clearly depicts the interaction effects in Models 3 and 5. Panel (a) shows the interaction for the general same annex variable, in which the categories depict either membership to the same annex or

²⁰ We also ran models with the friend of friends, enemy of enemies, friend of enemies and enemy of friends triad statistics separately. In these cases, the sign of the direction was usually as expected (positive for friends of friends and enemies of enemies, and negative for the other two relationships), but the coefficients were not always significant due to high correlations among these variables. For parsimony, and as we are not testing hypotheses regarding structural balance theory, we thus chose a version with the more general triad statistic. All other results remained robust.

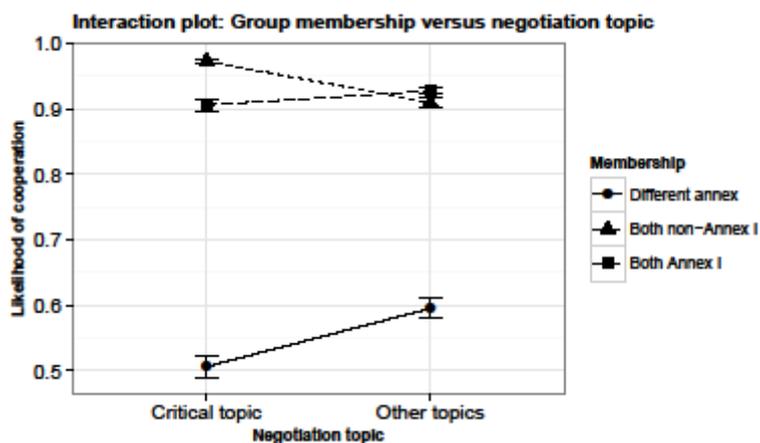
not. Clearly, countries in the same annex interact substantially more cooperatively with each other. In addition, they tend to cooperate even more if the topic under discussion is a critical topic related to mitigation, to the principles of the convention, or to the rules under a new agreement. In contrast, countries that are not in the same annex tend to behave more cooperatively whenever they are discussing other, not so critical issues under negotiation. Panel (b) shows separate effects for being together in Annex I and being together in non-Annex I. While on average the group effect is strong for both groups, we see that only non-Annex I countries are more cooperative when they discuss critical topics with each other. The graph again supports the idea that the incentives hypothesis is valid in particular for the developing / non-Annex I countries.

Figure 5: Interaction plot: Group membership versus negotiation topic

(a): For dyads being in the same annex or not



(b): For dyads being together in non-Annex I, in Annex I or in none



We also tested regressions including the control variables as separate controls for the target and the sender, and without using logged versions of population, income, and similar variables. The main results are not affected by these changes.

5.3 Results from the rate model: 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 socialization, which argues that the group effect should become steadily stronger over time, as the countries within each group develop a common understanding of the negotiation issues, common positions, trust and a common identity.

We set up the rate model in a consistent way to the type model including the same set of covariates. As explained above, we test this hypothesis on the one hand by looking at subsets of only cooperative or only conflictive interactions among our dyads. We expect that our main explanatory variable, *same annex*, will have a negative and significant effect on the survival time of the cooperative interactions (which would mean a positive effect on their frequency), and a positive and significant effect on the survival time of the conflictive interactions (thus, a negative effect on their frequency). Secondly, we test the hypothesis on the basis of the interaction between *same annex* and *cooperation* in the full dataset of interactions among the dyads. If the coefficient on this interaction is negative, this indicates that countries that are in the same annex and cooperate tend to interact more often over time.

Table 2 shows the corresponding results. In Model 6, we find a positive and significant effect of *same annex* on the survival time of conflictive interactions, which supports the socialization hypothesis: countries that are in the same annex tend to conflict with each other less often over time. Interestingly, Model 7 shows that this effect is only relevant for pairs of countries between the non-Annex I group. Models 8 and 9 show the results for the subset of cooperative interactions. We do not find a general effect of being in the same annex on the frequency of cooperative interactions. But again, we find that pairs of non-Annex I countries tend to cooperate more frequently over time, while pairs of Annex I countries tend to cooperate less frequently over time. Taking all these results together, it seems that socialization seems to take place mostly between the members of the non-Annex I group.

Finally, looking at the results for the full sample in Models 10 and 11, we see that being in the same annex, and particularly being together in the non-Annex I group increases the frequency of overall interaction. We also see that pairs of countries that cooperate tend to interact more often over time, but this is not true for pairs of countries that belong to the same annex. It thus seems that if countries within the same annex agree with each other, they tend to express such agreement less often over time – they probably feel that their views are being sufficiently represented by their peers.

The network statistics behave as would be expected. Countries that are more active as senders and countries that are more popular as targets tend to interact more frequently over time, regardless of the type of interaction. Country pairs that reciprocate each other's treatment tend to interact less frequently over time. Over time, countries that form clusters tend to interact less frequently in a conflictive manner, but more frequently overall. Countries that are more similar as senders or as targets tend to interact less frequently over time.

The results for our control variables show in parts inconsistent results with the type model. This, however, is sensible as we now focus on the frequency of events instead of the likelihood of cooperation. Larger countries (in terms of population) tends to interact less frequently over time (both as senders and as targets), which may be due to the fact that, as the negotiations progressed, delegations of smaller countries have become more experienced and skilled and have developed own positions, which leads them to participate more frequently in comparison.

Pairs of countries that are more different in terms of their vulnerability to climate change tend to interact more frequently over time, maybe due to a similar effect as described above: small and vulnerable countries have become more skilled and outspoken in defending their goals in the negotiations. Pairs of

countries that are more different in terms of greenhouse gas emissions and openness towards FDI tend to interact less frequently as time passes, particularly for cooperative interactions. Likewise, pairs of countries with larger aid flows or within the same country coalition tend to interact less frequently over time, and this is also especially the case for cooperative interactions. In contrast, country dyads with larger trade flows tend to have fewer conflictive interactions, but more cooperative interactions over time. This may hint towards an increasing importance of bilateral economic ties for how countries behave in the negotiations.

Countries within the same region tend to interact less frequently over time as well, but this is due in particular to a reduction in their conflictive interactions. Countries tend to interact more frequently over time with the coalitions they belong to, regardless of the type of interaction. The frequency of interaction of English speaking countries tend to increase over time, regardless of the type of interaction. Against what would be expected, countries that are party to the UNFCCC or the Kyoto Protocol tend to interact less frequently over time as senders and as targets. This unintuitive result may be driven by the US, which is an important player in the negotiations even though it never ratified the Kyoto Protocol. Results for the other control variables are not robust or insignificant.

6 Conclusions

Many multilateral environmental agreements have established differentiated rules and obligations for different groups of parties. The climate change regime is the most extreme case of such differential treatment, having introduced differentiation of the main obligations in the agreement across two very rigid groups of countries. In this paper, we investigate the argument that such an extreme form of differential treatment has affected the negotiations within the climate regime, leading to a politicization of the Annex I / non-Annex I distinction and to an increased polarization of these two groups. We test this effect and two causal mechanisms that may lead to it (creation of new incentives and socialization) on the basis of a dynamic network analysis in a dyadic dataset of negotiation behaviour by parties to the UNFCCC between 1995-2013.

Our findings so far clearly support our first two hypotheses, while support for the third one is mixed. The consistently positive and significant effect of our variable *same annex* in our type regressions indicates that pairs of countries that are members of the same annex to the Convention (Annex I or non-Annex I) have a higher likelihood of behaving cooperatively in the negotiations, over and above their ex-ante characteristics and related preferences. The results of the type model also show that this effect of being in the same annex is stronger when the discussions are about mitigation, about this and other critical topics in the negotiations, and during times when new agreements are being negotiated. These findings support our hypothesis 2: the effect of being in Annex I or non-Annex I is linked to the new incentives generated by the costly mitigation obligations introduced by the regime. However, the effect of such new incentives seems to be stronger among the members of the non-Annex I group, which is the group subject to preferences. Finally, the results of the rate model support the idea that cooperative interactions become more frequent over time or conflictive interactions less frequent over time, but this is true only for the non-Annex I countries. Socialization thus appears to work on only one of the peer groups created by the climate change regime, and probably only during part of the whole negotiation period, as shown by our graphs depicting the evolution of cooperative interactions over time.

Our findings thus confirm the ‘constructed peer group’ hypothesis proposed by Castro et al. (2014), that the split between Annex I and non-Annex I countries has indeed influenced negotiation behaviour in the UNFCCC and thereby amplified the divide between developing and industrialized countries. The deliberate creation of new country groups in the institutional design of the Climate Convention has thus

had unintended long-term consequences for the future development of the negotiations within the organization.

These results imply that, in the future, paying more attention to institutional design could strengthen IGOs' contribution to achieving their goals within the international community. If initial differentiation is necessary to achieve an agreement in the first place, this differentiation should be institutionalized in a way that minimizes the creation of incentives for keeping the status quo. In this context, our theoretical discussion suggests that differentiation on the basis of clear criteria and the specification of transparent graduation rules should be preferred to rigid country lists. Indeed, differential treatment needs to work within a controlled framework, in which it does not obstruct the general purpose of the treaty, but responds to real differences across countries and ceases to exist when these differences cease to exist (Rajamani 2006). At the same time, it may be helpful to establish institutional structures that channel the formal and informal negotiations in a more open, transparent and inclusive way, and to build bridges between different groups, so that socialization takes place across the whole range of parties to the UNFCCC, rather than within particular subgroups.

Table 1: Results from the rate model

	<i>Conflictive interactions</i>		<i>Cooperative interactions</i>		<i>All interactions</i>	
	<i>Model 6</i>	<i>Model 7</i>	<i>Model 8</i>	<i>Model 9</i>	<i>Model 10</i>	<i>Model 11</i>
<i>Network statistics</i>						
Sender outdegree	-1.96 (0.27) ***	-1.93 (0.27) ***	-1.02 (0.06) ***	-0.90 (0.06) ***	-0.50 (0.04) ***	-0.51 (0.04) ***
Target indegree	-0.74 (0.27) **	-0.68 (0.27) ·	-0.96 (0.06) ***	-0.85 (0.06) ***	-0.63 (0.04) ***	-0.64 (0.04) ***
Reciprocity	8.44 (2.57) **	7.24 (2.59) **	5.94 (0.68) ***	5.90 (0.68) ***	7.14 (0.59) ***	6.71 (0.59) ***
Triad	3.68 (1.37) **	4.53 (1.39) **	0.68 (0.30) ·	-0.81 (0.31) ·	-0.48 (0.21) ·	-0.76 (0.22) ***
Sender similarity	0.04 (0.00) ***	0.04 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***
Target similarity	0.02 (0.00) ***	0.02 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***
<i>Main independent variable and interactions</i>						
Same annex	0.09 (0.02) ***		0.00 (0.01)		-0.06 (0.01) ***	
Both non-Annex I		0.14 (0.03) ***		-0.04 (0.01) ***		-0.11 (0.02) ***
Both Annex I		0.00 (0.04)		0.11 (0.01) ***		0.03 (0.02) ·
Cooperation					-0.03 (0.01) **	-0.03 (0.01) **
Same annex * Cooperation					0.07 (0.01) ***	
Both non-Annex I * Cooperation						0.10 (0.02) ***
Both Annex I * Cooperation						0.04 (0.02) ·
<i>Control variables</i>						
Sender population (log)	0.01 (0.00) ·	0.01 (0.00) ·	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***
Target population (log)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00) ·	0.00 (0.00) ·	0.00 (0.00) **	0.00 (0.00) **
Income difference (log)	0.01 (0.02)	0.00 (0.02)	0.01 (0.00)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)
GHG emissions difference (log)	0.01 (0.00)	0.01 (0.00)	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) **	0.01 (0.00) ***
GHG per capita difference (log)	-0.03 (0.01) ·	-0.03 (0.01) ·	0.00 (0.00)	0.00 (0.00)	-0.01 (0.00)	0.00 (0.00)
Democracy difference	0.01 (0.00) ·	0.00 (0.00)	-0.01 (0.00) ***	0.00 (0.00) ·	-0.01 (0.00) ***	0.00 (0.00) **
Agriculture difference	0.00 (0.00)	0.00 (0.00)	0.00 (0.00) ***	0.00 (0.00) ·	0.00 (0.00) ·	0.00 (0.00)
Vulnerability difference	-0.02 (0.00) ***	-0.02 (0.00) ***	-0.01 (0.00) ***	0.00 (0.00)	-0.01 (0.00) ***	0.00 (0.00) ·
Forest difference	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 difference	0.00 (0.00) ·	0.00 (0.00) **	0.00 (0.00)	0.00 (0.00) ·	0.00 (0.00)	0.00 (0.00)
FDI difference	0.01 (0.00) ·	0.01 (0.00) ·	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***	0.01 (0.00) ***
Trade flows (log)	0.00 (0.00) ***	0.00 (0.00) ***	-0.01 (0.00) ***	-0.01 (0.00) ***	-0.01 (0.00) ***	-0.01 (0.00) ***
Aid flows (log)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00) ***	0.00 (0.00) ***	0.00 (0.00) ***	0.00 (0.00) **
Same region	0.10 (0.03) ***	0.09 (0.03) ***	0.01 (0.01)	0.01 (0.01) ·	0.03 (0.01) ***	0.04 (0.01) ***
Same coalition	0.05 (0.05)	0.08 (0.05)	0.06 (0.01) ***	0.07 (0.01) ***	0.06 (0.01) ***	0.06 (0.01) ***

Coalition member	-0.25 (0.08) **	-0.29 (0.08) ***	-0.09 (0.01) ***	-0.07 (0.01) ***	-0.09 (0.01) ***	-0.08 (0.01) ***
English sender	0.01 (0.02)	0.02 (0.02)	0.04 (0.01) ***	0.04 (0.01) ***	0.04 (0.01) ***	0.04 (0.01) ***
English target	0.10 (0.02) ***	0.10 (0.02) ***	0.04 (0.01) ***	0.03 (0.01) ***	0.05 (0.01) ***	0.05 (0.01) ***
Sender is a party	0.57 (0.03) ***	0.56 (0.03) ***	0.55 (0.01) ***	0.56 (0.01) ***	0.56 (0.01) ***	0.56 (0.01) ***
Target is a party	0.64 (0.03) ***	0.63 (0.03) ***	0.51 (0.01) ***	0.52 (0.01) ***	0.53 (0.01) ***	0.54 (0.01) ***
AIC	148533.05	148524.49	727920.59	727668.83	877051.16	876952.45
BIC	148737.59	148736.09	728171.45	727928.34	877325.03	877243.99
Log Likelihood	-74237.53	-74232.25	-363931.30	-363804.40	-438494.60	-438443.20
Observations	8545	8545	42201	42201	50746	50746

***p < 0.001, **p < 0.01, *p < 0.05, · p < 0.1

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Appendix: Data and variables

This Appendix describes data and variables starting with the codebook for our variable measuring cooperative and conflictive interactions in the negotiations. Table A1 then presents an overview of the definition, sources and descriptive statistics of all variables used in the paper, while Table A2 presents the correlation table.

Codebook for relational data between parties to the UN Framework Convention on Climate Change, 1995 – 2013

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 (11th Session of the INC in New York) and December 2013 (COP19 in Warsaw). The original ENBs can be downloaded from <http://www.iisd.ca/vol12/>. The ENBs have been chosen as the data source since they are seen as a detailed and objective source of information by many negotiators and observers in the climate talks, and because there are no publicly available official transcripts of the negotiations.

The 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. The dataset contains relational data between parties to the UNFCCC, which has been obtained by coding how parties to the UNFCCC react to other parties’ interventions: the observations in the dataset describe which countries support, agree with, oppose, or criticize other countries’ statements or positions 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.

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, to ensure that all have the same understanding of how the coding should be done. Intercoder reliability was tested using Cohen’s kappa. Values ranged from 0.77 to 0.92, which was deemed to indicate a substantial reliability. Questions regarding the dataset should be directed to Paula Castro (castro@pw.uzh.ch).

2. Variable description

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

Relation: The type of reaction of Country 1 to a statement/position by Country 2: speaking on behalf of, support, speaking with, agreement, delaying proposal, opposition, criticism. Detailed descriptions of the individual types of relations can be found below. For the analysis in this paper, we do not use these

detailed types of relations, but just a binary coding of all cooperative (speaking on behalf of, support, speaking with, agreement) and all conflictive (delaying proposal, opposition, criticism) interactions.

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 (includes not only COP meetings, but also meetings of its subsidiary bodies).

Topic: Issue area to which the statements by Country 1 and Country 2 refer: Mitigation, adaptation, finance, etc.

Comment: Usually quotes the text that shows the coded interaction (in quotation marks). May also include comments regarding 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.

Coder: Person who coded this observation.

ID_{own}: Observation ID, which consists of the ENB Number followed by an observation counter within that ENB.

3. Description of coded relationships

On behalf of: when Country 1 speaks on behalf of or for an ad-hoc group of countries. In this case, it is clear that the group of parties has previously coordinated a common position, which is being presented by Country 1 for the whole group. On behalf of is not coded when a member of an established coalition (such as the EU or the G77) speaks on behalf of this coalition (e.g. “Grenada, on behalf of AOSIS...” is coded simply as a statement by AOSIS). In this case, the membership of these coalitions is already fixed, and it is clear that if the coalition makes a statement, all of its members have already agreed to this position.

Example: “COLOMBIA, for Costa Rica, Chile, Panama and Peru, highlighted the need to ensure: continuity to a second commitment period under the Kyoto Protocol; comparable commitments by Annex I countries not party to the Kyoto Protocol; predictability on the continuation of finance for the 2013-2020 period; and continued progress in ADP discussions.”

Support: is used when the text explicitly says “Country 2, supported by Country 1, ...”, even when this support is expressed in different sentences.

Example: “He (the EU) said additional effort should be made to reduce uncertainty in GWPs but that parties should use them if they wish. Japan supported the GWP position (...). Australia (...) also supported continued use of GWPs.”

Agreement: when several countries are reported to hold the same position on an issue. This may be a text like “several parties, including Country 1, Country 2 and Country 3, proposed ...”. Agreement may be coded also when two different sentences refer to the same position being held by different countries, even though the relationship (agreeing with each other) is not explicitly written.

Example: “The EU, the US and CANADA stressed the need to ensure consistency with the capacity building aspects of other discussions on technology transfer and adaptation.”

Spoke with: when the text says something like “Country 1, with Country 2 and Country 3, stated / mentioned / ...”. In this case it is clear that all these countries said more or less the same, but it is not clear whether Country 1 explicitly supported the other countries, whether they just had the same position, or whether there has been any active coordination between the parties in terms of their positions.

Example: “On the election of the Board, SAMOA, with the EU and BULGARIA, called for consideration of gender balance.”

Delaying proposal: when a country proposes that someone else’s proposal be discussed at a later time.

Example: “NEW ZEALAND called for consistency with Protocol language, and said the issue of share of proceeds for adaptation should be addressed later, and elsewhere.”

Opposition: when the text reports one country opposing the statement or position expressed by other(s). Has also been coded when the word “opposition” is not explicitly mentioned, but it is clear from the statements that they oppose each other.

Example: “Expressing disappointment at the lack of a more substantive outcome, the G-77/CHINA, opposed by the EU, proposed an alternative text”

Criticism: when Country 1 directly criticizes Country 2 or its position / statement.

Example: “The MALDIVES lamented that reliance on the phrase “form should follow function” [used by China] is slowing down the negotiations”.

4. Description of coded topics

Adaptation: Discussions related to measures aimed at adapting to the already existing impacts of climate change. Includes also discussions related to “loss and damage”, “vulnerability”, “adverse effects of climate change”, “risk assessment and insurance”.

Mitigation: Discussions related to emission reductions and e.g. who should take them up. Includes also discussions regarding the general level of “ambition” for mitigation (e.g. the 2°C goal), “QELROs” and “NAMAs”, “AAU carry over”, “low carbon growth”, whether “offsetting” should at all be used, policies and measures (“P&M”), and discussions about “renewable energy” and “energy efficiency”. Further, it includes discussions regarding “equity”, “burden sharing” and “application of the CBDR principle” as long as they cannot be coded under another topic – e.g. finance. Also coded under this topic are discussions about the possible mitigation gap between the first and the second commitment period of the Kyoto Protocol; but if the discussion is about the continuation of a specific part of the protocol – for example the mechanisms – then it is coded as that topic (in this case “flexibility mechanisms”), and if it is about legal instruments to bridge the gap, then it is coded as “institutional arrangements”.

Example: “SOUTH AFRICA said the EU’s 30% emission reduction target by 2020 was not sufficiently ambitious and questioned the scientific basis for a 15-30% deviation from business-as-usual for developing countries by 2020.”

Finance: Discussions related to how much finance should be provided by developed countries to support adaptation and/or mitigation in developing countries; how should this finance be channeled; who should

provide finance; and other discussions involving “means of implementation” in general (i.e. including the provision of “finance, technology, and capacity building”). If the discussion is both about adaptation and finance or mitigation and finance, priority should be given to adaptation / mitigation. But if the discussion is about finance for different purposes (“finance for adaptation AND mitigation should be provided from public sources...”), then it should be coded as finance.

Example: “The EU reaffirmed the GEF’s role as the UNFCCC’s financial mechanism. The Philippines, for the G-77/CHINA, said the GEF is not the financial mechanism but its operating entity.”

Capacity Building: Discussions related to improving the capacity of developing countries (and their peoples, societies and policy-makers) to respond to climate change. Includes measures related to education. Typical keywords: “New Delhi Work Programme”; “UNFCCC Article 6 (Education, Sensitization of the Society)”.

Example: “The EU, the GAMBIA, JAPAN, IRAN, SENEGAL, KENYA and others stressed the need for a followup to the New Delhi work programme.”

Technology: Discussions related to improving technology transfer to developing countries in order to support their response to climate change. Typical keywords are: “technology transfer”, “IPRs” (intellectual property rights”. If discussed in combination with finance (e.g. provision of finance for adaptation, mitigation, technology transfer and capacity building), then it should be coded as finance.

Example: “The US, EU and JAPAN supported adopting the 2006 Work Plan of the Expert Group on Technology Transfer (EGTT) as proposed, while Malaysia and Ghana, both speaking for the G-77/CHINA, suggested some additions.”

International transport: Discussions related to how to deal with the emissions from international aviation and maritime transport. Typical keywords are: “international aviation”, “bunker fuels”, “IMO” (International Maritime Organization), “ICAO” (International Civil Aviation Organization).

Example: “Several parties, including JAPAN, TUVALU and Slovenia, for the EU, identified the need to address international aviation and maritime transport emissions. ”

LULUCF (forests): Discussions related to how to account GHG emissions or removals from land use, land use change and forests. These discussions are usually about accounting in industrialized (Annex I) countries, unless it is about whether to include forest-related projects under the CDM (in which case it should be coded as CDM). Discussions related to reducing deforestation in developing countries should be coded under REDD below.

Example: “AUSTRALIA, NEW ZEALAND, ICELAND and others also urged reviewing of rules on LULUCF and flexible mechanisms.” (coded for both LULUCF and Flexibility mechanisms)

Flexibility mechanisms: Discussions regarding the market-based mechanisms introduced in the Kyoto Protocol: “CDM” (Clean Development Mechanism), “JI” (Joint Implementation) and “ET” (Emissions Trading). Also includes discussions about introducing new market-based mechanisms in a new agreement: “sectoral trading”, “sectoral crediting”, “new market mechanisms”, “framework for various approaches”, “Additionality”, “AIJ”, “designated operational entity”, problems with HCFC-22 and HFC-23 resulting from CDM.

Example: (Title) Inclusion of lands with forests in exhaustion under the CDM: “ETHIOPIA, supported by BRAZIL, suggested a technical workshop.” (even if this is actually an agreement on an organizational issue (having a workshop), it is clear that Ethiopia and Brazil agree on discussing this specific CDM-

related topic. The organizational aspect is here considered subsidiary to the topic of flexibility mechanisms.

REDD (*reducing emissions from deforestation*): Discussions related to promoting the reduction of emissions from deforestation and forest degradation in developing countries. Includes also measures to conserve or enhance forest carbon stocks and sustainable forest management (known as REDD+). Discussions about the financing of REDD are coded under this topic instead of under finance.

Example: “SWITZERLAND, the EU and AUSTRALIA said a sufficient methodological basis now exists for REDD activities”

Organisation: Discussions regarding the organization of the negotiation meetings and agenda setting, such as: observation of religious holidays when planning a meeting; gender questions when appointing a committee; when should something be discussed; whether a workshop on a specific topic should be organized; whether contact groups or informal discussions should be convened; whether two negotiation processes should be combined; which topics should be discussed; how much time should be spent on discussing specific topics; which discussions should be prioritized.

Example: “The US, CANADA, AUSTRALIA and NEW ZEALAND emphasized the importance of recognizing progress made under the AWG-LCA,”

Institutional arrangements: Discussions about existing and new institutions or rules within the climate regime, such as: whether a new expert group / fund / committee / forum should be created (unless it is about a negotiating group, which would be coded as Organisation); what mandate a specific institution has; what are the terms of reference or rules of procedure or “modalities and procedures” for a particular body; whether amendment procedures, voting rules, consensus rule should be changed; etc. Additionally coded under this topic are discussions about “the review of the commitments (under Article 4.2 (a) and (b))”; relationships between the UNFCCC and other external fora - for example discussions about where to deal with HFCs (if under the UNFCCC or under the Montreal Protocol) -; the introduction of a 'registry' for developing country NAMAs (but if the discussion is about what the registry should contain it is coded as "Mitigation non-Annex I").

Example: “COSTA RICA, COLOMBIA, GUYANA, SURINAME and the EU opposed any change to the consensus rule”

Content of new agreement: Discussions about reaching a new agreement (a protocol or similar), or about amending an existing agreement (e.g. continuing or amending the Kyoto Protocol). Also discussions about what “building blocks” or issue areas should be covered by a new agreement. If the discussion is about a specific topic (e.g. mitigation actions under the new agreement), then it should be coded under that specific topic.

Example: “He noted that the negotiating text should contain a more balanced and clear reflection of the Group’s proposals.”

Reporting: Discussions regarding how to measure, monitor, report and/or review national levels of emissions, policies to address climate change, and similar. Typical keywords are “GHG inventories”, “national communications”, “MRV” (monitoring, reporting and verification), “ICA” (international consultation and analysis), “IAR” (international assessment and review).

Example: “On reports on national greenhouse gas CHINA supported the second option, with BRAZIL suggesting some amendments to it. The US also supported the second option”

Principles: Discussions about the principles of the Convention or the principles that should guide new agreements, but only if these discussions do not refer at the same time to more specific topics such as adaptation, mitigation, finance, etc. Examples of such principles are: equity, fairness, transparency, inclusiveness, CBDR (common but differentiated responsibilities), CBDR&RC (common but differentiated responsibilities and respective capabilities), effectiveness, historical responsibility, capacity, polluter pays principle, etc.

Example: “EL SALVADOR, speaking on behalf of Argentina highlighted COP 18 as an important milestone for strengthening the multilateral climate regime under the principles of equity and CBDR.”

Response measures: Refers to discussions regarding the impact of climate policies (“response measures”, “potential consequences”, “spillover effects”) on developing countries’ economies (e.g. on the economy of oil-producing countries). The topic is frequently linked to adaptation, but we tried to code it as a separate issue. It is also frequently discussed in connection with “Convention Articles 4.8 and 4.9” and “Articles 2.3 and 3.14 of the Kyoto Protocol” (which refer both to the need to support adaptation and to minimize the impact of response measures).

Example: “CONVENTION ARTICLES 4.8 AND 4.9: Progress on implementation of decision 1/CP.10 (Buenos Aires programme of work): SAUDI ARABIA, supported by the UNITED ARAB EMIRATES and QATAR, noted that the issue had been pending for “a very long time” but requested that reference linking a workshop on 1/CP.10 to a workshop on Protocol Articles 2.3 and 3.14 be deleted.”

Agriculture: Discussions on how to enhance the adaptation of agriculture to climate change impacts, or mitigation in this sector.

Example: “CHINA underscored the importance of agriculture for food security, poverty reduction and sustainable development, and with SOUTH AFRICA, indicated that adaptation is more important than mitigation in this sector.”

Research / climate science: Discussions relating to the newest IPCC findings, about how to improve knowledge about climate science or climate change impacts, about what new scientific reports to request from the IPCC or what type of research is needed.

Example: “INDONESIA, MALAYSIA and others highlighted the need for regional and local modeling.”

5. Further coding rules

- If one text section refers to two topics in combination, e.g. if the discussion is about finance for adaptation, or about mitigation measures in the new agreement, or about a new institution to assess the impact of response measures, then this text section is coded only once. The topic that is perceived to be more central to the discussions is chosen. Some general rules for such prioritization are given above under each topic. Only if a text section refers to two clearly separated topics (e.g. in the text “AUSTRALIA and NEW ZEALAND urged reviewing of rules on LULUCF and flexible mechanisms”), then this text section is coded twice in the dataset (in the case shown, once for the topic LULUCF and one for the topic flexibility mechanisms).
- For agreement and with: as in these cases it is not clear in which direction the relationship goes, then it is coded in both directions: “SAMOA with EU” is coded as “Samoa – with – EU” and as “EU – with – Samoa”.
- If several countries (more than 2) agree with each other, then each pair is coded as a new observation, and again in both directions (e.g. “AUSTRALIA, NEW ZEALAND, ICELAND and

others...” is coded in different rows as “Australia – agreement – New Zealand”, “Australia – agreement – Iceland”, “New Zealand – agreement – Australia”, “New Zealand – agreement – Iceland”, “Iceland – agreement – Australia”, “Iceland – agreement – New Zealand”.

- If several countries oppose or support another one, then not only the opposition or the support is coded, but also the agreement between all countries that are supporting / opposing.
- Reactions (opposition, criticism, etc.) to what the Chair of the group or the UNFCCC Secretariat have proposed or organized are not coded, because the Chairs (even if they come originally from a specific country) are supposed to be neutral.
- In some sentences it is not clear what is the topic under discussion (e.g. “the EU and PAPUA NEW GUINEA supported a COP decision on methodological issues in Poznań”). In these cases, the sentences immediately before and after, and the heading of the ENB section are used to decide what the topic is (in the example above, from the previous text it becomes clear that the sentence refers to REDD).

Table A1: Variable descriptions, sources and descriptive statistics

Variable	Description	Observations	Mean	Std. Dev.	Min	Max	Source
Relation	Type of interaction (on behalf of, support, with, agreement, delaying proposal, opposition, criticism)	61465	4.15	0.98	1.00	7.00	ENBs 1995-2013, own coding
Cooperative interaction	The interaction is cooperative (1) or conflictive (0)	61465	1.83	0.37	1.00	2.00	ENBs 1995-2013, own coding
Topic	Topic of the interaction (e.g. mitigation, adaptation, finance, technology, ...)	61465	9.39	4.30	1.00	19.00	ENBs 1995-2013, own coding
Mitigation	Topic of the interaction is mitigation	61465	1.80	0.40	1.00	2.00	ENBs 1995-2013, own coding
Critical topic	Topic of the interaction is critical (mitigation, principles, new agreements)	61465	1.74	0.44	1.00	2.00	ENBs 1995-2013, own coding
Critical period	Time period in which new agreements are being discussed	61465	1.24	0.43	1.00	2.00	Own coding
Event sequence	Continuous sequence of interaction events	61465	3751.09	2367.01	1.00	6864.00	Own analysis
Same annex	Sender and target country are in the same annex (Annex I or non-Annex I) of the Convention	61465	1.73	0.44	1.00	2.00	UNFCCC website
Same annex, 3 categories	Sender and target country are together in Annex I or in non-Annex I	61465	1.94	0.69	1.00	3.00	UNFCCC website
Sender outdegree	Past activity of current sender as sender	61465	0.13	0.12	0.00	0.69	Own analysis
Sender indegree	Past popularity of current sender as target	61465	0.13	0.12	0.00	0.73	Own analysis
Target outdegree	Past activity of current target as sender	61465	0.13	0.12	0.00	0.71	Own analysis
Target indegree	Past popularity of current target as target	61465	0.13	0.12	0.00	0.73	Own analysis
Inertia	Tendency of actors to behave in the same way as they did in the past (cooperatively or conflictively)	61465	0.01	0.01	0.00	0.08	Own analysis
Reciprocity	Tendency of actors to reciprocate past cooperative or conflictive negotiation behavior	61465	0.01	0.01	0.00	0.08	Own analysis
Triad	Tendency to form closing triads with a third actor (clustering)	61465	0.04	0.04	0.00	0.21	Own analysis
Target similarity	Similarity of current target's senders with other targets' senders	61465	1.14	0.89	0.00	4.65	Own analysis
Sender similarity	Similarity of current sender's targets with other senders' targets	61465	1.13	0.88	0.00	4.67	Own analysis
Sender population (log)	Total population of sender country (logged)	61349	10.55	2.36	2.23	15.53	World Bank 2016
Target population (log)	Total population of target country (logged)	61338	10.63	2.39	2.23	15.53	World Bank 2016
Income difference (log)	GDP per capita PPP (constant 2011 intl \$, absolute difference between sender and target)	61210	1.02	0.85	0.00	5.34	World Bank 2016
GHG emissions difference (log)	Total GHG emissions (ktCO ₂ e, logged, abs. difference between sender and target)	57759	2.43	2.25	0.00	16.01	World Bank 2016
GHG per capita difference (log)	GHG emissions per capita (tCO ₂ e/cap, logged, abs. difference between sender and target)	57759	1.04	0.87	0.00	6.81	World Bank 2016
Democracy difference	Level of democracy (Freedom House/imputed Polity, abs. difference between sender and target)	61170	2.88	2.76	0.00	10.00	Teorell et al. 2016
Agriculture difference	Value added from agriculture (% of GDP, abs. difference between sender and target)	61198	9.33	9.37	0.00	63.19	World Bank 2016
Vulnerability difference	Population affected by droughts, floods, extreme temperatures (% of population, average 1990-2009, abs. difference between sender and target)	56189	1.69	2.14	0.00	9.23	World Bank 2016
Forests difference	Forest area (% of land area, abs. difference between sender and target)	61212	22.07	17.35	0.00	98.31	World Bank 2016
Fossil rents difference	Rents from coal, oil and natural gas production (% of GDP, abs. difference between sender and target)	60026	9.57	13.07	0.00	72.70	World Bank 2016
FDI difference	Openness to FDI (abs. difference between sender and target)	58437	3.14	3.60	0.00	158.79	World Bank 2016
Trade flows (log)	Total trade flows between sender and target (current British Pounds, logged)	61465	11.35	9.30	0.00	26.36	Fouquin and Hugot 2016, imputed with UNCOMTRADE

Variable	Description	Observations	Mean	Std. Dev.	Min	Max	Source
Aid flows (log)	Total aid flows between sender and target, including emerging donors (constant USD, logged)	61465	2.80	6.24	0.00	23.20	Tierney et al. 2011; AidData 2016; Strange et al. 2016
Same region	Sender and target are located in the same geographical region	61465	0.24	0.43	0.00	1.00	Fouquin and Hugot 2016
Same coalition	Sender and target are members of the same climate negotiations coalition (excl. G77)	61465	1.29	0.46	1.00	2.00	Own coding
English sender	English is national or official language of sender country	61430	0.36	0.45	0.00	1.00	Lewis 2009
English target	English is national or official language of target country	61452	0.36	0.45	0.00	1.00	Lewis 2009
Sender is a party	Sender country is a party to the UNFCCC (1), to the Kyoto Protocol (2) or none (0)	61465	1.51	0.52	0.00	2.00	UNFCCC website
Target is a party	Target country is a party to the UNFCCC (1), to the Kyoto Protocol (2) or none (0)	61465	1.51	0.53	0.00	2.00	UNFCCC website
Coalition member	Interaction is between a coalition and one of its members	61465	1.04	0.18	1.00	2.00	Own coding

Table A2: Correlation table

	Relation	Cooperative interaction	Mitigation	Critical topic	Critical period	Event sequence	Same annex	Same annex, 3 categories	Sender outdegree	Target indegree	Inertia	Reciprocity	Triad
Relation	1.000												
Cooperative interaction	-0.843	1.000											
Mitigation	0.005	-0.041	1.000										
Critical topic	0.014	-0.060	0.830	1.000									
Critical period	0.000	-0.049	0.185	0.216	1.000								
Event sequence	-0.065	0.059	0.063	-0.066	-0.268	1.000							
Same annex	-0.367	0.422	-0.078	-0.103	-0.062	0.108	1.000						
Same annex, 3 categories	-0.309	0.345	-0.003	0.002	0.116	-0.014	0.831	1.000					
Sender outdegree	0.038	-0.069	0.086	0.036	0.021	0.295	-0.081	0.083	1.000				
Target indegree	0.025	-0.076	0.082	0.027	0.049	0.260	-0.102	0.079	0.320	1.000			
Inertia	-0.026	-0.008	0.096	0.079	0.226	0.105	0.066	0.332	0.599	0.614	1.000		
Reciprocity	-0.021	-0.006	0.095	0.078	0.227	0.105	0.067	0.335	0.596	0.595	0.961	1.000	
Triad	0.036	-0.082	0.108	0.064	0.159	0.250	-0.061	0.210	0.741	0.741	0.861	0.861	1.000
Target similarity	-0.019	-0.018	0.040	-0.034	-0.083	0.540	0.008	0.037	0.706	0.563	0.482	0.475	0.709
Sender similarity	-0.024	-0.009	0.033	-0.041	-0.068	0.530	0.015	0.041	0.564	0.673	0.471	0.466	0.692
Sender population (log)	0.037	-0.049	0.072	0.022	0.038	0.147	-0.066	-0.027	0.390	0.098	0.244	0.272	0.299
Target population (log)	0.015	-0.072	0.064	0.020	0.031	0.120	-0.075	-0.041	0.099	0.433	0.267	0.234	0.292
Income difference (log)	0.131	-0.144	-0.009	0.000	-0.072	-0.039	-0.358	-0.484	-0.120	-0.117	-0.285	-0.286	-0.238
GHG emissions difference (log)	0.041	-0.037	0.003	0.005	-0.022	-0.043	-0.071	-0.109	-0.015	-0.015	-0.090	-0.090	-0.072
GHG per capita difference (log)	0.064	-0.049	-0.002	0.004	-0.063	-0.010	-0.142	-0.218	-0.061	-0.063	-0.153	-0.152	-0.128
Democracy difference	0.216	-0.248	-0.043	-0.038	-0.073	-0.025	-0.261	-0.431	-0.031	-0.043	-0.185	-0.185	-0.108
Agriculture difference	0.074	-0.069	-0.057	-0.049	-0.094	-0.080	-0.179	-0.366	-0.186	-0.179	-0.274	-0.275	-0.282
Vulnerability difference	0.012	-0.005	-0.013	-0.014	-0.085	0.021	0.014	-0.123	0.030	0.015	-0.034	-0.033	-0.009
Forests difference	0.020	-0.010	-0.052	-0.043	-0.064	-0.010	0.005	-0.102	-0.082	-0.106	-0.143	-0.142	-0.119
Fossil rents difference	0.096	-0.101	-0.015	-0.026	-0.049	0.108	0.006	-0.124	-0.004	-0.022	-0.121	-0.120	-0.049
FDI difference	-0.003	0.006	-0.001	0.002	0.016	0.060	0.001	0.014	0.020	0.019	0.051	0.050	0.013
Trade flows (log)	-0.019	0.029	-0.004	0.035	0.017	-0.033	0.028	0.096	-0.023	-0.072	-0.060	-0.056	-0.013
Aid flows (log)	0.176	-0.207	0.057	0.081	0.031	-0.053	-0.499	-0.400	0.046	0.052	-0.116	-0.117	-0.032
Same region	-0.103	0.116	-0.034	-0.017	-0.029	-0.010	0.191	0.124	-0.098	-0.113	-0.087	-0.087	-0.134
Same coalition	-0.201	0.238	-0.050	-0.057	-0.019	0.135	0.382	0.382	0.001	-0.015	0.104	0.106	0.075
English sender	0.009	-0.013	0.039	0.047	0.064	-0.084	-0.023	0.070	0.047	0.049	0.129	0.132	0.116
English target	-0.002	-0.003	0.035	0.039	0.067	-0.078	-0.022	0.073	0.053	0.079	0.139	0.138	0.131
Sender is a party	-0.056	0.058	0.038	-0.080	-0.406	0.896	0.092	-0.048	0.232	0.191	0.028	0.026	0.153
Target is a party	-0.058	0.062	0.036	-0.082	-0.402	0.896	0.093	-0.048	0.220	0.195	0.027	0.030	0.152
Coalition member	-0.097	0.057	0.002	-0.023	-0.014	-0.007	0.119	0.037	-0.029	0.024	-0.070	-0.077	-0.032

	Target similarity	Sender similarity	Sender population (log)	Target population (log)	Income difference (log)	GHG difference (log)	GHG/cap difference (log)	Democracy difference	Agriculture difference	Vulnerability difference	Forests difference	Fossil rents difference	FDI difference
Target similarity	1.000												
Sender similarity	0.853	1.000											
Sender population (log)	0.270	0.186	1.000										
Target population (log)	0.194	0.261	0.112	1.000									
Income difference (log)	-0.103	-0.101	-0.054	-0.049	1.000								
GHG emissions difference (log)	-0.056	-0.060	-0.158	-0.135	0.107	1.000							
GHG per capita difference (log)	-0.047	-0.038	-0.188	-0.173	0.427	0.344	1.000						
Democracy difference	0.018	0.022	0.053	0.056	0.266	0.025	0.061	1.000					
Agriculture difference	-0.180	-0.177	-0.048	-0.032	0.715	0.065	0.272	0.223	1.000				
Vulnerability difference	0.051	0.059	0.165	0.154	0.174	0.143	0.099	0.258	0.132	1.000			
Forests difference	-0.038	-0.040	-0.160	-0.160	0.057	0.052	0.117	0.186	0.040	0.042	1.000		
Fossil rents difference	0.084	0.095	-0.073	-0.074	0.175	-0.097	0.052	0.413	0.047	-0.045	0.170	1.000	
FDI difference	-0.027	-0.029	-0.077	-0.074	-0.020	0.058	-0.016	-0.021	0.002	-0.024	0.056	-0.007	1.000
Trade flows (log)	0.062	0.071	-0.053	-0.125	-0.072	-0.086	-0.028	0.029	-0.205	0.143	0.095	0.078	-0.196
Aid flows (log)	-0.003	-0.004	0.071	0.057	0.368	0.028	0.124	0.107	0.129	0.106	-0.006	-0.054	-0.038
Same region	-0.052	-0.046	-0.091	-0.106	-0.073	-0.069	-0.061	-0.084	-0.102	0.019	-0.062	0.051	-0.013
Same coalition	0.131	0.155	-0.162	-0.185	-0.201	-0.151	-0.095	-0.175	-0.126	-0.020	0.029	0.004	-0.048
English sender	-0.050	-0.019	-0.059	0.025	-0.026	0.149	0.146	-0.130	0.060	0.033	-0.090	-0.187	-0.004
English target	-0.004	-0.034	0.023	-0.041	-0.037	0.138	0.138	-0.131	0.051	0.032	-0.089	-0.189	-0.013
Sender is a party	0.449	0.430	0.116	0.103	-0.017	-0.044	-0.009	-0.002	-0.046	0.037	0.013	0.103	0.073
Target is a party	0.438	0.436	0.127	0.092	-0.014	-0.044	-0.009	-0.005	-0.043	0.038	0.013	0.102	0.074
Coalition member	-0.013	-0.012	0.114	0.181	-0.056	-0.053	-0.031	-0.019	-0.012	-0.007	-0.013	-0.004	-0.010

	Trade flows (log)	Aid flows (log)	Same region	Same coalition	English sender	English target	Sender is a party	Target is a party	Coalition member
Trade flows (log)	1.000								
Aid flows (log)	0.203	1.000							
Same region	0.261	0.006	1.000						
Same coalition	0.335	-0.195	0.223	1.000					
English sender	-0.009	-0.018	-0.096	0.061	1.000				
English target	0.011	-0.019	-0.092	0.066	0.037	1.000			
Sender is a party	-0.049	-0.041	-0.013	0.072	-0.117	-0.077	1.000		
Target is a party	-0.050	-0.040	-0.011	0.072	-0.082	-0.111	0.897	1.000	
Coalition member	-0.237	-0.090	-0.048	-0.120	0.007	0.009	0.005	0.005	1.000