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Forecasting the Paris 2015 UNFCCC Negotiations

The Exchange Model's Analysis of Developments and Potential Obstacles to Reaching an Agreement

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Executive summary

1. This research note presents analyses of the upcoming UNFCCC negotiations in Paris (November 30th to December 11th, 2015). We aim to contribute to an effective agreement in Paris by sharpening negotiators' expectations concerning the likely developments and obstacles to reaching an agreement, as well as to demonstrate the application of the Exchange Model.

There are two main parts to the approach used here:

- 1.1. The first part is a stakeholder analysis, which consists of a description of the negotiations using the best available qualitative expert knowledge. We gained access to some of the most prominent and best informed negotiators and observers of the CoP21. Through a series of semi-structured interviews, we developed a dataset on the 13 most controversial issues that will be addressed in Paris.
 - 1.2. The second part of the approach applies the Exchange Model to this dataset. The Exchange Model encapsulates the idea that stakeholders attempt to reach an agreement by combining issues with each other and making deals across issues. The Exchange Model, which is part of a family of game theoretic models of negotiations, has a strong 20-year track record in forecasting the outcomes of complex negotiations and in supporting strategic interventions to improve outcomes.
2. Three issues present serious obstacles to reaching an agreement in Paris.
 - 2.1. The issue of Differentiation concerns the question of what should be the main basis for effort sharing between developed and developing countries. The positions range from states that are opposed to incorporating the principle of Common But Differentiated Responsibilities (CBDR) to states that favour an extensive form of differentiation. Most states will moderate their positions and support a form of CBDR in the light of national circumstances. However, Russia will remain opposed to any form of CBDR, while Brazil will insist on a stronger commitment to CBDR.
 - 2.2. The issue of Mitigation MRV (Measuring, Reporting and Verification) concerns the minimum MRV and compliance provisions in the agreement on mitigation. Most states will moderate their positions to support a form of International Consultation and Analysis (ICA) embedded in a multilateral process even with some aspects of International Assessment and Review (IAR). China will remain opposed to any form of ICA embedded in a multilateral process, while the EU will insist on retaining the Kyoto compliance regime.
 - 2.3. The issue of Finance Who Pays? is about whether developing countries, and if so which ones, should be obliged or invited to contribute to the climate fund. Most states will be willing to compromise, but the substance of the compromise they will be willing to accept still needs to be formulated. We suggest that a logical compromise involves a form of performance-based contributions. The Arab states will remain opposed to expanding the group of contributors beyond developed countries.

Meanwhile, the EU will continue to call for a system in which more developing countries (except the LDCs and SIDS) are obliged to contribute.

3. A greater degree of convergence is expected on the remaining issues. These can be divided into the following areas:
 - 3.1. Mitigation Legal Form and Ex Ante Assessment of Intended Nationally Determined Contributions (INDCs). There will be a significant degree of convergence on the need for a binding agreement with an obligation for each country to have a (non-binding) country-specific target in the form of an INDC. A consensus will emerge that there should be an ex ante assessment (EEA) of the aggregate ambition, but not technical EEAs of each INDC.
 - 3.2. Adaptation. A consensus will emerge on the need for non-binding country-specific commitments to adaptation targets. A broad consensus will also emerge on strengthening the present institutional framework for adaptation, as well as on reserving a significant proportion of finance for adaptation. There will, however, be little appetite for more than a preambular reference to Loss and Damage in the agreement.
 - 3.3. Finance. A consensus will emerge on the need for a large increase in the volume of finance, somewhere in excess of \$350bn per annum of public and private funds by 2030.
 - 3.4. Ambition level. A consensus will emerge in support of a 2050 goal of 70% greenhouse gas reduction relative to 2010 levels. For the 2100 goal, there will be agreement on zero net emissions with some reference to repairing the damage with negative emissions. Most stakeholders will agree on a mechanism to ensure that future commitments are at least as strong as those made in Paris (no backsliding or a non-binding progression principle), although India will remain reluctant to accept such a principle.
4. These forecasts are based on the assumption that the negotiators are willing to link all of the main controversial issues during the course of the negotiations. The negotiators may, however, separate the negotiations on the financial issues from the other issues. If they do so, then an agreement is far more difficult to achieve both within the subset of financial issues and in the subset of non-financial issues. Moreover, the agreement – if reached at all – would be at least as financially costly for developed countries.

1. Introduction¹

The 21st session of the Conference of the Parties to the United Nations Framework on Climate Change (CoP21) will be held in Paris from November 30th to December 11th, 2015. Our hope is that this event will result in a new international agreement on climate that will be ambitious enough to keep global warming below 2°C, and the aim of our study is to support negotiators in achieving this agreement. The research approach we use is based on applied game theoretic modelling that simulates and forecasts negotiation processes and outcomes. The approach has been applied extensively and successfully in a wide range of highly complex negotiations, including those on the formation on international treaties. One of the previous applications was the CoP15 held in Copenhagen in 2009, in which the model accurately predicted the disappointing outcome of that conference and offered what could have been a strategy to achieve an agreement.

The main question we address in this report is the following: What are the likely shifts in the stakeholders' policy stances on the key controversial issues? Answers to this question identify potential obstacles to an agreement in the form of particular stakeholders and issues. Answers to this question also help us to forecast the substantive outcomes that can be expected from the conference. This knowledge enables negotiators to focus their attention on the aspects of the negotiation that are expected to be particularly challenging.

There are two main parts to our research approach. The first part consists of a stakeholder analysis that makes use of the best available qualitative expertise on the negotiations. With tried-and-tested semi-structured interview techniques, we formulated a stylised description of the main elements of the negotiations. We received access to and extensive cooperation from practitioners and close observers. These included a series of lengthy meetings with a team of practitioners from the European Commission's DG Climate Action, including one of the EU's main negotiators, and input from policymakers in the Dutch Ministry of Infrastructure and Environment, and extensive input from two experts at the Oslo Climate Institute Cicero. In addition, we received input from officials in the UK government, a close observer of this and many previous CoPs from the Earth Negotiation Bulletin, and a representative of the business community. The specification of the key controversial issues was validated with an online survey of 40 climate change experts held by Cicero. The stakeholder analysis consists of a detailed inventory of the main stakeholders' policy stances on each of these issues, the level of salience each

¹ This report is part of a larger project on Paris 2015 with Professor Bruce Bueno de Mesquita (New York University), Professor Detlef Sprinz (Potsdam University) and the Oslo Climate Institute Cicero. The Exchange Model applied here was developed in close cooperation with Reinier Van Oosten, who also developed the software, financed by the company *Decide* (now part of the dutch group). We are grateful for the extensive cooperation from practitioners and close observers of Paris 2015, including experts from the European Commission's DG Climate Action, the Dutch Ministry of Infrastructure and Environment, the UK government, Earth Negotiation Bulletin, the Oslo Climate Institute Cicero, the international business community, and 40 climate change experts who participated in Cicero's online survey. We thank Lars Padmos for research assistance.

stakeholder attaches to each issue, and each stakeholder's power or potential influence. We drew mainly on input from the experts at DG Climate Action to specify the key controversial issues. The information on stakeholders' policy stances draws mainly on documentary sources consulted by experts at Cicero. The information on stakeholders' issue salience and power are based mainly on estimates provided by practitioners, partly because it is difficult to derive valid indicators of these characteristics from documentation.

The second part of the research approach consists of the Exchange Model, which we apply to the descriptive information from the stakeholder analysis. The Exchange Model encapsulates the intuitively plausible idea that negotiations are driven by a process of political exchange, whereby stakeholders make concessions on some issues in return for concessions on other issues. The model formalises the conditions under which political exchanges take place and provides a tool for analysing complex negotiations in which many stakeholders and issues are involved. The Exchange Model, in various stages of development, has been the subject of a large number of peer-reviewed publications over the past 20 years in some of the most prestigious university presses and journals in political science (e.g. Bueno de Mesquita and Stokman 1994; Dijkstra et al. 2008; Stokman et al. 2013; Thomson et al. 2006). The Exchange Model is part of a tradition of research involving the formal analysis of complex negotiations. In addition its academic track record, the model has performed well in a wide range of applied research projects, in which it has been used to advise clients who are engaged in complex negotiations. These have included public and private sector negotiations at the national and international levels.

2. The Stakeholder Analysis

The stakeholders consist of 15 states or groups of states. Non-governmental actors including environmental and industry groups are also relevant to the global governance of climate change. They raise awareness of the problem, lobby governments to adopt certain policy responses, and influence the positions taken by governments. However, the consensus among practitioners and informed observers is that the CoPs are events in which the relevant actors are states and groups of states.

Some of the 15 stakeholders are groups of states. Given the complexity of global negotiations, many small and medium-sized states coordinate their negotiating positions. For example, the European Union's 28 members are represented by the EU as a collective actor, rather than 28 separate governments. We defined the stakeholder list in such a way that the overlap between the stakeholders was minimised. This is an important consideration for the application of the model, since we should avoid counting a state more than once, which would overestimate its influence. The stakeholder list is also defined in such a way that we are able to represent the main policy positions taken and the relative priorities of the main actors. We find, for instance, that the negotiation positions of the USA, Japan and Russia are not well represented by the Umbrella Group (a loose coalition of non-EU

developed countries). We therefore list the USA, Japan and Russia as separate stakeholders, but include the Umbrella Group as a collective actor that represents the views of the remaining members reasonably well (Australia, Canada, New Zealand, Kazakhstan, Norway and Ukraine). After some deliberation, we decided not to include France as a separate stakeholder despite the fact that it chairs the CoP21 since this would overestimate the European influence on the negotiations. We also excluded the G77 as a separate stakeholder, because the influence this loose coalition’s members are represented by other stakeholders included in the analysis.

Table 1 lists the 15 stakeholders together with estimates of their relative power and the importance each attaches to reaching an agreement in Paris. Figure 1 gives the same information graphically. Relative power is defined as the potential a stakeholder has relative to others to influence other actors and the decision outcome. We conceive of power as based on a complex array of hard and soft resources, including but not limited to the formal rules of the negotiation process, diplomatic skills, technical expertise, economic power, and legitimacy. The estimates of relative power are based on the qualitative judgements of the experts that incorporate their knowledge of a range of hard and soft power resources.

Table 1. The Stakeholders, their Relative Power and the Importance they Attach to Reaching an Agreement

Stakeholder	Abbreviation	Relative Power	Importance Attached to Reaching Agreement
China	China	100	70
USA	USA	100	50
European Union	EU	75	90
Brazil	Brazil	70	70
India	India	60	80
Japan	Japan	60	50
Russia	Russia	60	10
Alliance of Small Island States	AOSIS	50	100
Least Developed Countries	LDCs	50	95
Arab states	Arab states	40	5
Umbrella Group minus the USA, Russia and Japan	Umbrella minus	40	40
Independent Alliance of Latin America and the Caribbean	AILAC	35	80
The Environmental Integrity Group: Liechtenstein, Monaco, the Republic of Korea and Switzerland	EIG	35	80
African states	African group	25	80
Bolivarian Alliance for the Peoples of Our America	ALBA	5	5

The estimates of relative power indicate that China and the USA are equally powerful and hold more power than any of the other actors. The EU is the next most powerful stakeholder, followed by Brazil, India, Japan and Russia. The relations

between the numbers, rather than their absolute values, are relevant. So a stakeholder with a relative power score of 100 is twice as powerful as another stakeholder with 50 (the numbers do not imply that the stakeholder with 100 has all of the power or even a veto). Given that an agreement will require unanimous agreement, we assume that all of the main actors must converge at least to some extent on whatever compromise outcome emerges.

The estimates of the importance attached to reaching agreement refer to the effort each stakeholder is expected to make to achieve a unanimously accepted agreement. Estimates closer to 0 indicate that the stakeholder would more readily accept a situation in which the negotiations fail. This variable is not part of the Exchange Model, but it does highlight the stakeholders that deserve particular attention.

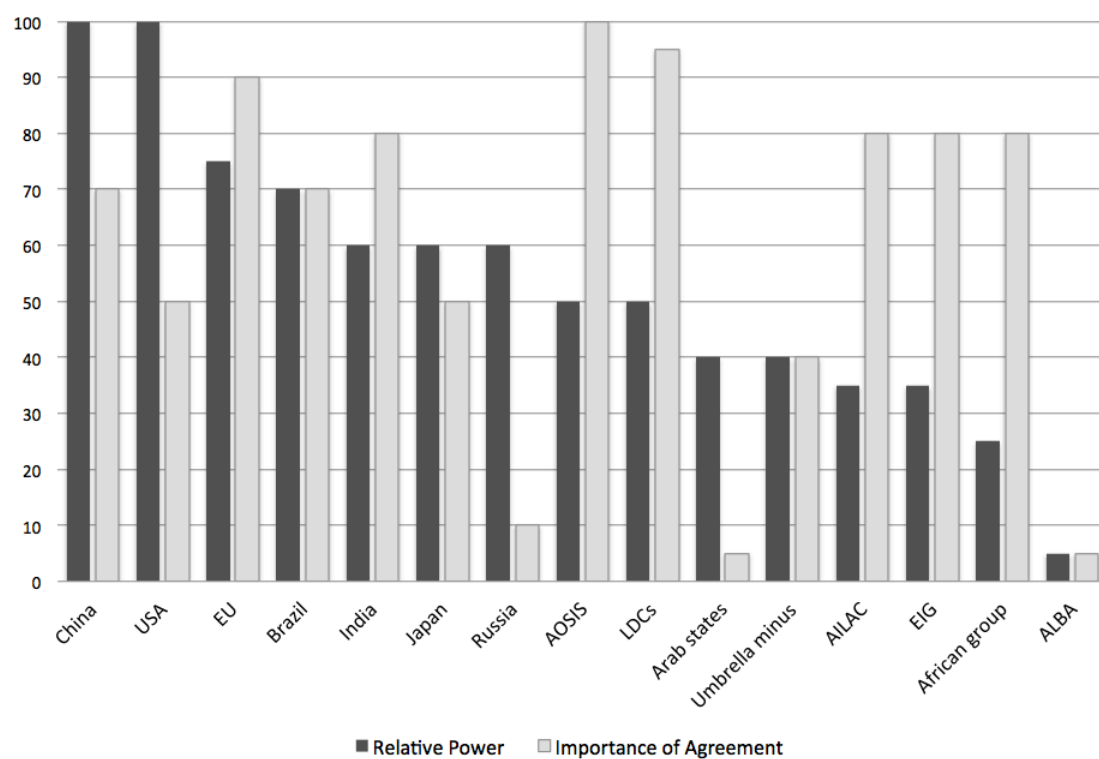


Figure 1. Relative Power and Importance of Agreement

The stakeholder analysis also identifies the main controversial issues that must be resolved if an agreement is to be reached. These consist of the following 13 points of contention.

- Differentiation. This is a cross-cutting issue that concerns the question of the main basis for effort-sharing between developed and developing countries in the new agreement.

Under the heading of Mitigation there are three main issues:

- Mitigation MRV (Measuring, Reporting and Verification) concerns the minimum MRV and compliance provisions in the agreement on mitigation.
- Mitigation Legal Form concerns the extent to which the agreement and its components relating to mitigation targets should be (internationally) legally binding.
- Ex Ante Assessments (EEAs) concern the provisions for assessment and review of the nationally determined contributions.

Under the heading of Adaptation, there are four main issues:

- Adaptation Legal Form centres on the question of the extent to which commitments to adaptation targets should be country-specific and legally binding.
- Adaptation Institutions is about the extent to which the institutional framework for adaptation should be strengthened.
- Adaptation Reserved Financing asks whether funds should be reserved for adaptation.
- Loss and Damage (L&D) is about the degree to which L&D from the effects of climate change should be included in an agreement.

Under the heading of Finance, there are two main issues:

- Finance Who Pays?, which concerns the question of whether developing countries, and if so which ones, should be obliged or invited to contribute to the climate fund.
- Finance Amount refers to the total amount of funds that will be mobilized by 2030.

Under the heading Ambition, we include three issues:

- Ambition 2050, which concerns the mitigation goal set for 2050.
- Ambition 2100 concerns the mitigation goal for 2100.
- Ambition Progression concerns the mechanism for strengthening commitments over time.

For each one of these 13 issues, the analysis identifies the position of each of the 15 stakeholders and the level of salience each stakeholder attaches to each issue. The positioning of each stakeholder involves defining the main policy alternatives on each issue in the form of policy scales, each of which ranges from 0-100. Each stakeholder is then placed on each policy scale to represent its policy stance. With a few exceptions, all of the stakeholders have positions on all of the issues. The exceptions are that some of the developing countries have no specific positions on the issues of Ambition 2050 and Ambition 2100.

The level of salience each stakeholder attaches to each issue refers to the effort the stakeholder invests in influencing other stakeholders on that issue and its inflexibility on the issue. Issue salience is also estimated on 0-100 scales. Higher values of issue salience indicate more effort and less flexibility, while lower values indicate less effort and more flexibility. Issue salience allows us to compare the relative importance of different issues for the same stakeholder, as well as the relative

importance of an issue to different stakeholders. These relative values are particularly relevant for the purposes of the Exchange Model.

3. The Exchange Model Applied

This section presents the main results from the Exchange Model. The input data consists of the numerical information on the stakeholders' positions on each of the 13 issues, their relative issue salience and their relative power. The analysis assumes that all 13 issues can be linked with each other if the stakeholders concerned have an incentive to do so.

The Exchange Model identifies all of the potential exchanges across each pair of issues in which Stakeholder A has an incentive to enter into an exchange with Stakeholder B. For an exchange opportunity to exist, certain conditions must be met. First, the stakeholders must disagree to some extent on both issues (technically, they must be on opposite sides of the expected outcome). Second, the stakeholders must differ in terms of the relative salience they attach to the issues involved. The technicalities of these conditions are explained in detail in the relevant academic publications. For the present purposes, it is noteworthy that the model identifies all potential exchanges and the implications of these exchanges for developments in stakeholders' positions and for the expected outcome of the negotiations on each issue. In addition, as will become clear later in this section, the model enables us to keep track of the consequences of exchanges for stakeholders that are not directly involved in exchanges: so-called positive and negative externalities for bystanders.

The Exchange Model simulates a series of negotiation rounds. In each round the potential exchanges are identified. Exchanges with the highest utility gains for the stakeholders directly involved are implemented first. The implementation of each exchange results in changes in the positions of the stakeholders involved. Stakeholder A makes a concession on its "supply" issue by shifting its position gradually towards the position of Stakeholder B, in return for receiving a concession from Stakeholder B on its (A's) "demand" issue. These shifts in positions are assumed to take place gradually, whereby the adjusted positions from one round are fed into the next round. This ensures that the results are not unduly driven by one or two big exchanges. We apply ten rounds of the Exchange Model. While ten rounds is somewhat arbitrary, experience in applying the model shows that there are little to no shifts in positions after the ten rounds. By the tenth round the stakeholders' positions have either converged or not.

With 15 stakeholders and 13 negotiation issues, there are a large number of exchange opportunities: too many to keep track of without the aid of a model implemented in a computer programme. The model identifies 129 exchange opportunities in round 1 and a total of 1,330 exchange opportunities across the ten simulated rounds of negotiations. To illustrate, in round 1, there are exchange opportunities involving:

- The USA and China on Finance Amount and Ex Ante Assessments. The USA offers a concession to China on EEAs in return for a concession from China on Finance Amount.
- The USA and China on Finance Who Pays? and Differentiation. The USA offers a concession to China on Finance Who Pays? in return for a concession from China on Differentiation.
- The EU and India on Mitigation MRV and EEAs. The EU offers a concession to India on EEAs in return for a concession from India on Mitigation MRV.

3.1. Obstacles to Reaching an Agreement in Paris

Three of the issues present particular difficulties for the negotiators in Paris. These are issues on which two or more very significant stakeholders do not converge towards the common position that others are likely to support.

Differentiation

This issue concerns the question of what will be the main basis for effort sharing in the new agreement. In particular, to what extent will differentiation be made between developed and developing countries with respect to the nature of their commitments? The 0-100 policy scale we constructed with the help of the experts to represent this controversial issue consists of the following positions:

- 0: No explicit differentiation (self-differentiation)
- 25: National circumstances
- 50: CBDR-Respective Capabilities in light of national circumstances
- 75: CBDR-Respective Capabilities (with no direct reference to the Convention's Annexes or Articles referring to those Annexes)
- 100: Annexes I and II of the Convention

Each of the abovementioned actors was placed on this policy scale to reflect its position on the issue as depicted in the figure below. Note that not all actors were placed on one of the policy scale points that were defined. Russia, for instance, was placed on position 15. This represents the general approach taken by the stakeholder on this issue as well as the inherent ambiguity in some of the positions in the preparations for the negotiations. The colours refer to the salience scores: 80-100 are red; 50 to 79 are orange; and below 50 are green. Issues on which both ends of the scale are red are therefore highly controversial.

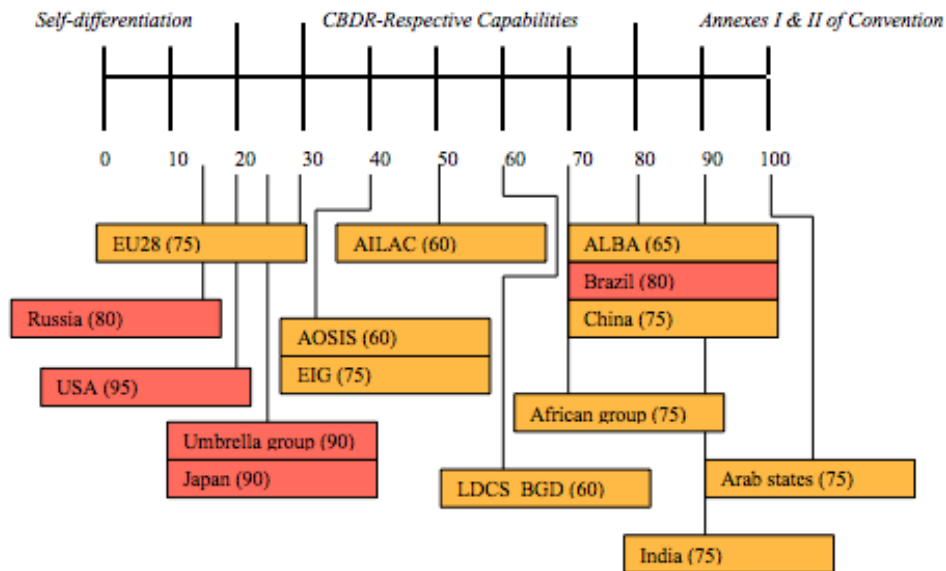


Figure 2. Stakeholders' Positions on the Issue of Differentiation

Note: Salience scores in parentheses

The Exchange Model forecasts shifts in the stakeholders' positions over ten negotiation rounds, as depicted in Figure 3. There will be considerable convergence towards positions 40-50 of the policy scale, which means that most stakeholders will accept the principle of CBDR in the light of national circumstances. Two stakeholders, however, will not shift their initial positions on this issue. Russia will remain opposed to the inclusion of any form of CBDR in the agreement (position 15). At the other side of the issue, Brazil will continue to argue that a stronger form of CBDR should be included in the agreement (position 80).

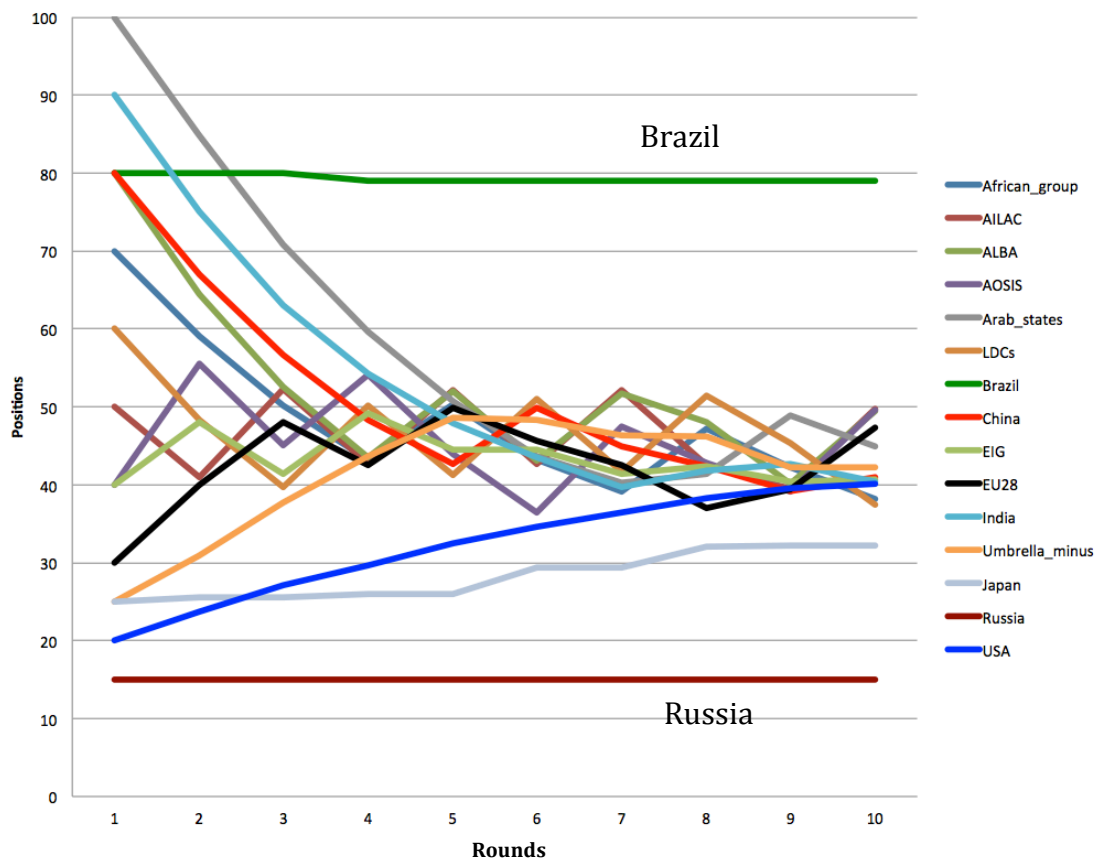


Figure 3. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Differentiation

Mitigation-MRV

The issue of Mitigation-MRV (Measuring, Reporting and Verification) concerns the minimum MRV and compliance provisions in the agreement on mitigation. The 0-100 policy scale constructed to represent the different positions taken consists of the following values:

- 0: International Consultation and Analysis (ICA)
- 45: ICA plus multilateral consultative process
- 65: International Assessment and Review (IAR)
- 75: IAR plus committee on implementation and/or compliance
- 100: Kyoto compliance regime

The stakeholders were placed on this policy scale to represent the positions they currently favour, as depicted in Figure 4.

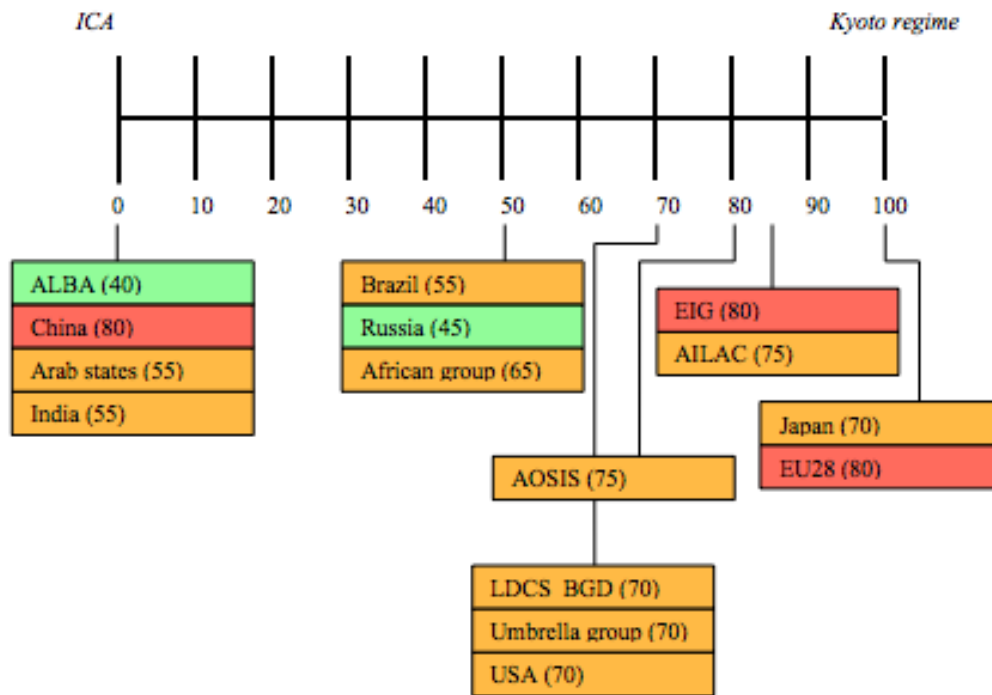


Figure 4. Stakeholders' Positions on the Issue of Mitigation MRV

Note: Salience scores in parentheses

The Exchange Model forecasts the shifts in the stakeholders' positions depicted in Figure 5. Most of the stakeholders will moderate their positions to somewhere in the range of positions 50-65 on the policy scale, which represents a willingness to accept ICA embedded in a multilateral consultation process, and even a willingness to incorporate some elements of IAR.

China and the EU, however, will make little or no moves from their current positions. In the case of China, the model predicts a softening of the opposition to a multilateral consultative process, but continuing opposition to the emerging consensus among the other actors. Meanwhile, the EU will continue to call for a much stronger compliance regime akin to the Kyoto arrangements.

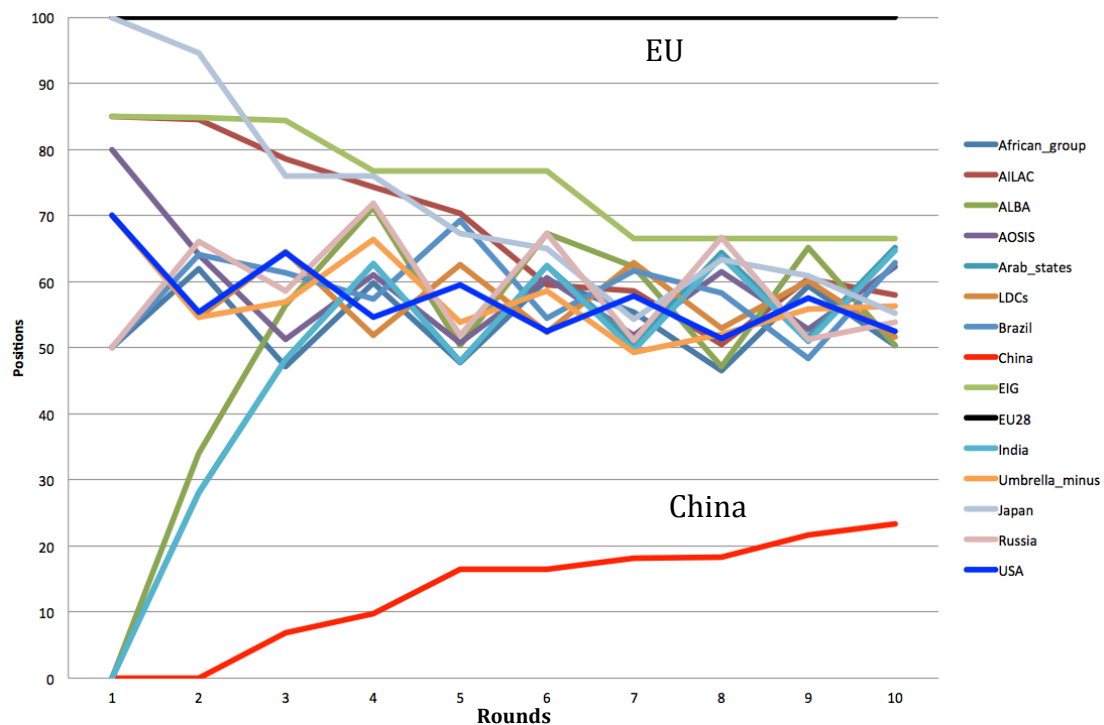


Figure 5. The Exchange Model’s Forecasts on the Development of Stakeholders’ Positions on the Issue of Mitigation MRV

Finance-Who Pays?

The issue of Finance-Who Pays? concerns the question of whether developing countries, and if so which ones, should be obliged or invited to contribute to the climate fund. The 0-100 policy scale for this issue is defined as follows:

- 0: Developed countries only required to contribute
- 20: Developed countries required to contribute, and other countries invited to contribute voluntarily
- 60: Developed countries and certain other countries required to contribute (e.g. “countries in a position to do so” or emerging economies).
- 80: All countries minus LDCs and SIDS required to contribute
- 100: All countries required to contribute.

Figure 6 depicts the stakeholders’ positions and relative salience scores on this issue. The experts indicated somewhat less certainty regarding the positions on the financial issues compared to the other issues. The preparatory talks held so far were said to have focused less on the financial issues than on the other issues. We also note that there is more clustering in the stakeholders’ positions on this issue than on the previous issues, which may be due to this uncertainty. While the option of requiring all countries to contribute (position 100) is theoretically possible and the logical endpoint of this scale, none of the stakeholders support this position.

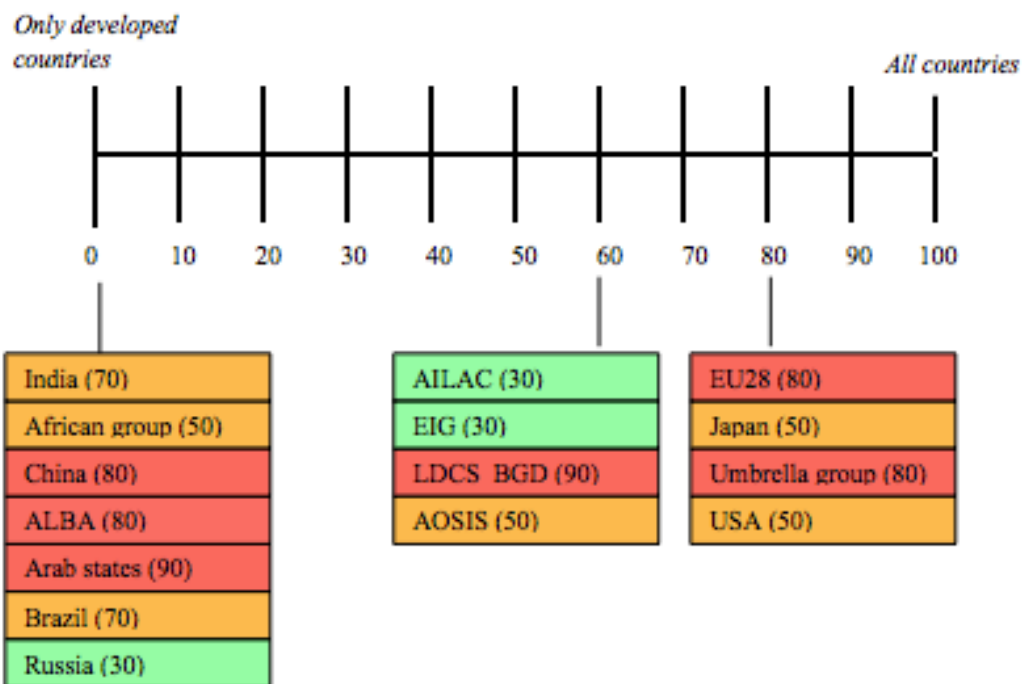


Figure 6. Stakeholders' Positions on the Issue of Finance Who Pays?

Note: Saliency scores in parentheses

The Exchange Model's forecasts of the development in stakeholders' positions on this issue indicate that while a significant amount of movement will take place in the positions on this issue, it will remain a potentially serious obstacle to reaching an agreement in Paris (Figure 7).

The forecasts indicate that most stakeholders will be willing to agree, but the substance of the compromise remains undefined. The model predicts that most stakeholders will move towards a compromise position in the range of 30-50 on this policy scale. This region lies between position 20, which stands for "developed countries required to contribute, and other countries invited to contribute voluntarily", and position 60, which stands for "developed countries and certain other countries required to contribute (e.g. 'countries in a position to do so' or emerging economies)". Formulating the substance of this compromise will require considerable attention. We suggest that a logical basis for defining this compromise could be a performance-based rule for gauging the level of contributions requested or required, whereby failure to meet country targets would mean higher contributions to the fund.

Notwithstanding the possibility of formulating a broadly supported compromise on this issue, some discussion will remain on the principle of obliging developing countries to contribute. The Arab states, the EU and the Umbrella Group (minus Japan, Russia and the USA) will be reluctant to support the compromise. On one side, the Arab states will continue to argue against the expansion of the group of contributors beyond the developed countries. The EU and the Umbrella Group

(minus) by contrast will continue to call for a system in which more developing countries, with the exception of LDCs and SIDS, are obliged to contribute.

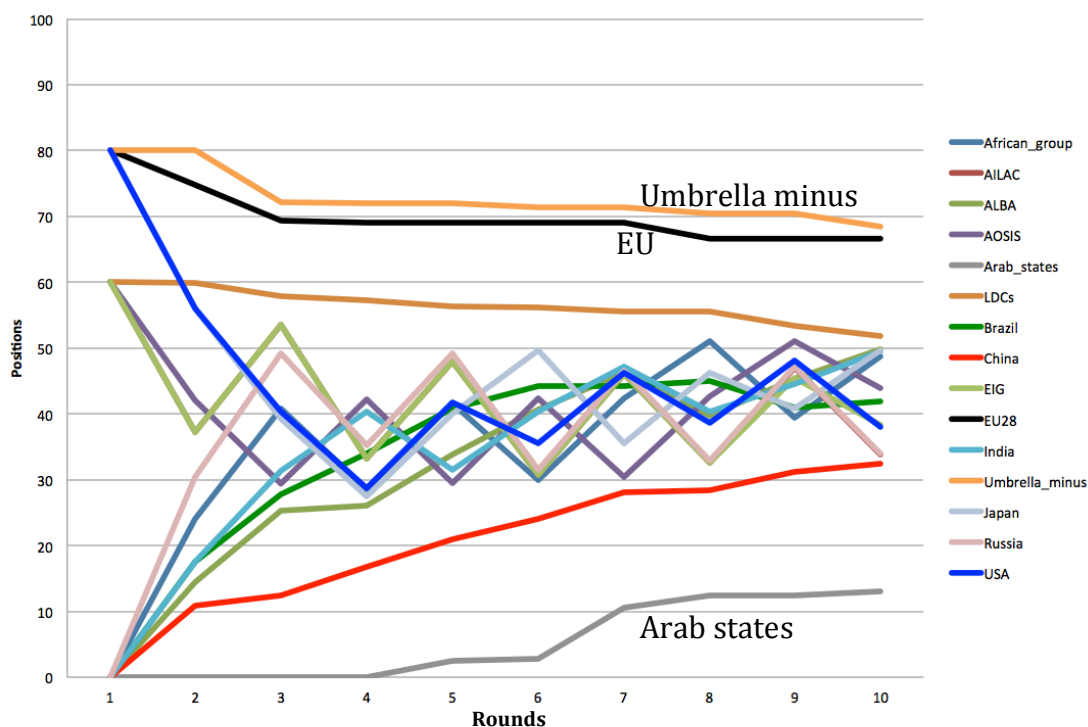


Figure 7. The Exchange Model’s Forecasts on the Development of Stakeholders’ Positions on the Issue of Finance Who Pays?

Negative Externalities Experienced by Each Stakeholder

When stakeholders enter into political exchanges during negotiations, they do so out of self-interest. Stakeholder A makes a concession toward Stakeholder B on an issue to which it (Stakeholder A) attaches relatively low salience, in return for a concession from Stakeholder B on an issue to which it (Stakeholder A) attaches relatively high salience. These shifts in positions move the expected decision outcome further from Stakeholder A’s position on the first issue and move the expected decision outcome closer to Stakeholder A’s position on the second issue.

Such shifts in stakeholders’ positions and the expected outcomes also have implications for stakeholders that are not directly involved: so-called externalities for bystanders. Some exchanges have positive externalities for a bystander, whereby the bystander is better off than before without having to make any concessions itself. Negative externalities are also possible, whereby the bystander ends up being worse off in terms of the expected outcomes of the negotiations as a consequence of exchanges in which it was not involved.

Stakeholders that experience negative externalities that greatly outweigh the positive externalities and gains from exchanges in which they themselves are involved deserve careful attention. If these are powerful stakeholders that are also

isolated on one or more key issues, this could present a significant obstacle to reaching a unanimous agreement.

Figure 8 presents the net gains or losses for each of the stakeholders as a consequence of both the exchanges in which each is involved (which are by definition positive) as well as from the positive or negative externalities from the exchanges in which each is a bystander. The key finding is that these are broadly in balance for most stakeholders, but that the EIG, China and Brazil experience substantial negative net externalities. The powerful position of China and Brazil and the fact that they are both relatively isolated on one of the key issues mean that these two stakeholders deserve particular attention.

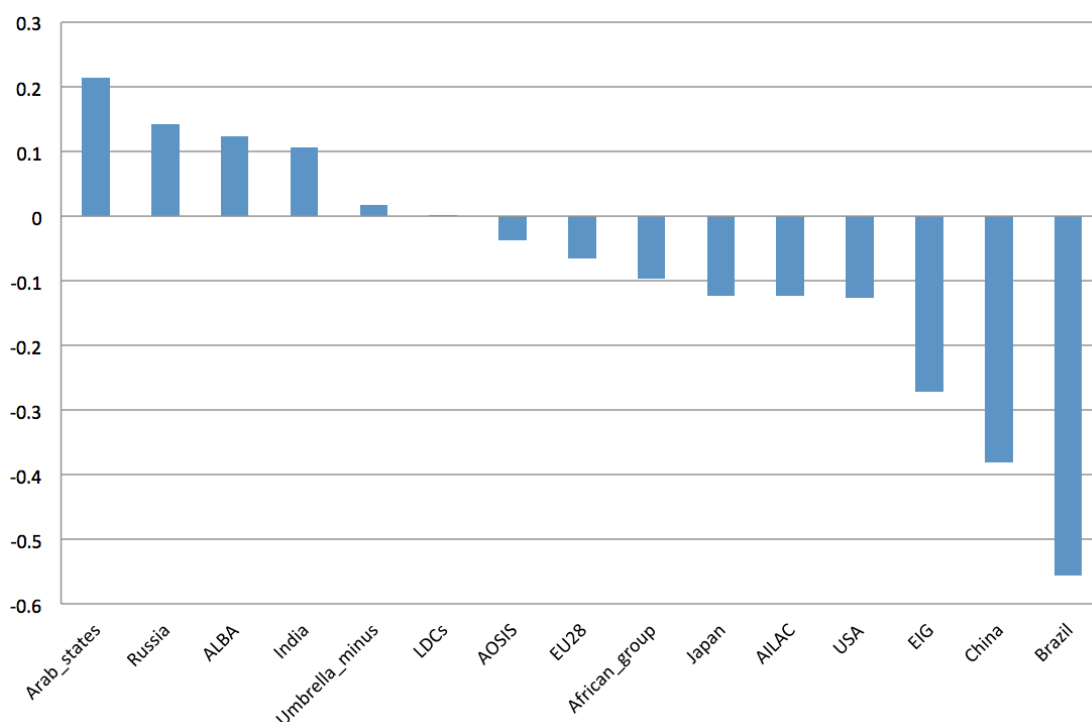


Figure 8. The Exchange Model’s Forecasts of the Net Effects of Exchanges for Each Stakeholder

3.2. Broad Convergence on the Remaining Issues

In contrast to the three issues mentioned above, the Exchange Model forecasts the development of broad consensus on the ten remaining issues. For comparison with the issues mentioned above, we discuss the issue of Mitigation Legal Form in some detail, but suffice with shorter summaries of the forecasts for the remaining nine issues. The graphs for these policy scales and position shifts are included in the appendix.

Mitigation Legal Form

The issue of Mitigation Legal Form concerns the question of the extent to which the agreement and its components relating to mitigation targets should be (internationally) legally binding. The alternative positions are summarized on the following 0-100 policy scale:

- 0: No binding agreement or binding country-specific targets
- 30: Binding agreement without country-specific targets.
- 50: Binding agreement plus obligation to have a (nonbinding) country-specific target (INDC)
- 70: The above plus obligation on measuring, reporting and verification.
- 100: Binding agreement plus binding, country-specific targets.

The positions of the stakeholders are depicted in the following figure.

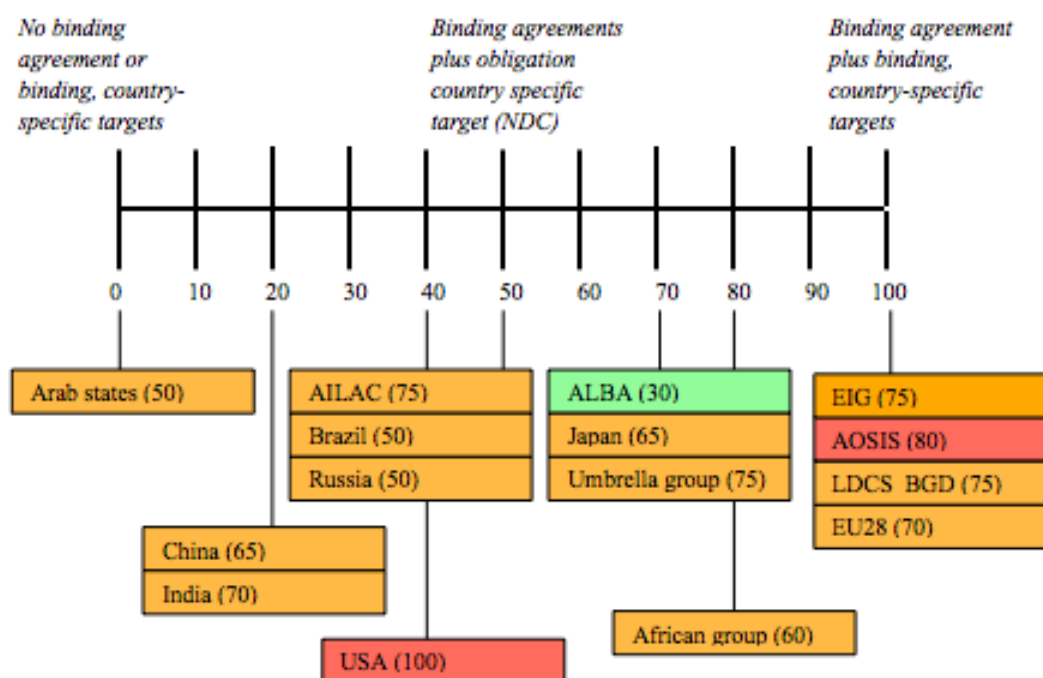


Figure 9. Stakeholders' Positions on the Issue of Mitigation Legal Form

Note: Salience scores in parentheses

The Exchange Model's forecasts show the emergence of consensus on this issue. Most stakeholders converge to or close to position 50, which represents a binding agreement with the obligation to have a (nonbinding) country specific target in the form of an INDC. The USA remains on its initial position of 40, which is not a position that has a distinct meaning, but rather indicates some degree of indifference between the inclusion or exclusion of the obligation to have a nonbinding country specific target. Given the convergence of positions, the Exchange Model's forecast of the outcome is closest to position 50 on the policy scale.

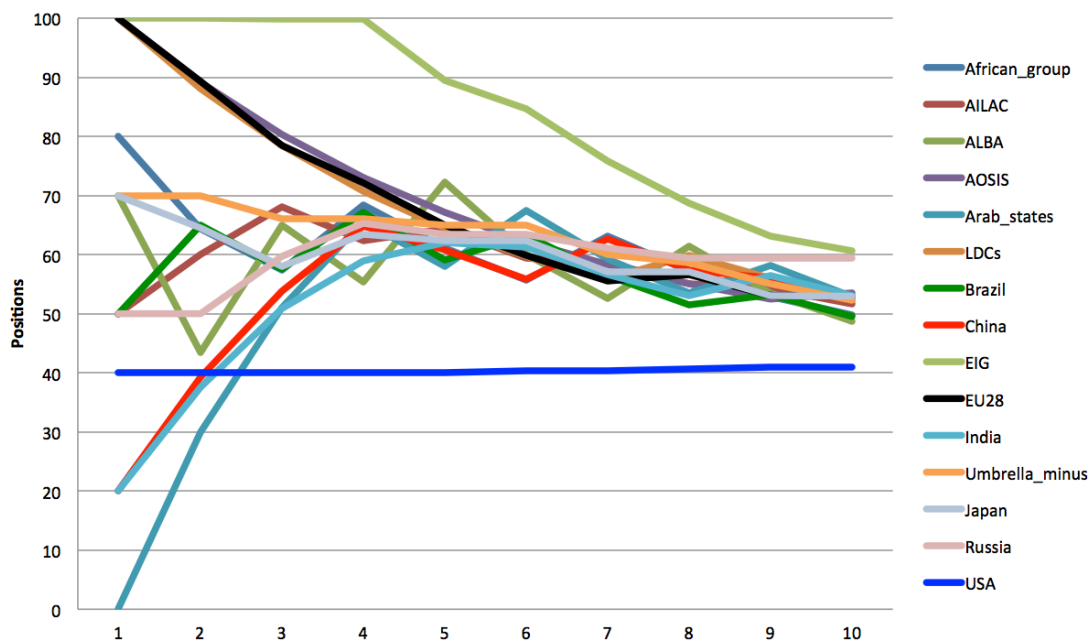


Figure 10. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Mitigation Legal Form

Ex Ante Assessments

The issue of Ex Ante Assessments (EAs) concerns the provisions to be included for assessment and review of the nationally determined contributions. The main alternatives on the 0-100 policy scale are:

0: Option 1: No EAA

20: Option 2: EAA of aggregate ambition

60: Option 3: EAA of aggregate ambition and technical EAA of individual INDCs (transparency, clarity, comparability, etc.)

90: Option 4: Option 3 plus a political assessment of individual INDCs (ambition and equity/fairness)

100: Option 5: Option 4 and a formal mechanism for involving inputs from civil society

The Exchange Model predicts a convergence of stakeholders towards position 20 on the scale. The outcome will therefore be Option 2 above, an EAA of aggregate ambition, but not technical EAs of individual INDCs.

Adaptation Legal Form

This issue focuses on the question of the extent to which countries' new commitments to adaptation targets should be country-specific and legally binding. The alternatives on the 0-100 policy scale are:

- 0: No new commitments to adaptation
- 40: Collective, non-binding provisions. E.g. "all parties are encouraged to integrate adaptation into their national plans"
- 80: Non-binding country-specific commitments
- 100: Legally binding country-specific commitments

The Exchange Model forecasts a consensus on the need for non-binding country-specific commitments (position 80).

Adaptation Institutions

To what extent should the institutional framework for adaptation be strengthened? Here, the positions on the 0-100 policy scale are:

- 0: No strengthening
- 60: Strengthen present institutions (stronger mandate, funding and knowledge platform)
- 80: Establish new institutions stronger than present ones.
- 100: Establish subsidiary body on adaptation

The Exchange Model forecasts the emergence of a broad consensus that accepts the need to strengthen present institutions, even to the extent that the present institutions take on new forms. Only the Arab states remain to some extent sceptical of the need to strengthen the institutional framework for adaptation.

Adaptation Reserved Financing

To what extent should funds be reserved for adaptation?

- 0: No earmarking for adaptation
- 50: Approximately 50% earmarked for adaptation
- 100: Dedicated levy for adaptation

The Exchange Model forecasts that most stakeholders will converge to a position close to point 60 on the scale, indicating that at least 50 percent of the funds should be earmarked for adaptation. The AILAC group will continue to call for more funds for adaptation and a dedicated levy or similar means of guaranteeing the reservation of funds.

Loss and Damage

To which degree will loss & damage (L&D) be included in an agreement?

- 0: No mention/omission of L&D
- 10: Preambular reference only
- 20: Reference to Warsaw International Mechanism (WIM) (under adaptation)
- 30: Separate chapter on L&D with little substance
- 40: Separate chapter on L&D and new institutional arrangements with little substance
- 50: Separate chapter on L&D and new institutional arrangements with new non-financial elements (such as coordination and capacity-building)
- 70: Separate chapter on L&D and new mechanism with new non-financial and financial elements (such as insurance) but no compensation regime
- 100: Separate chapter on L&D and new non-financial and financial elements, including a compensation regime

The Exchange Model forecasts position shifts towards the range of positions from 10-20 on the policy scale. The USA remains opposed to any reference to loss and damage in the agreement. We therefore expect little more than a preambular reference to loss and damage.

Finance Amount

What amount of funds should be mobilized (private and public) by 2030 (p.a.)?

- 0: no new target (i.e. \$100b p.a.)
- 20: Unspecified increase above \$100b p.a.
- 40: \$ 200b p.a.
- 60: \$ 300b p.a.
- 80: \$ 400b p.a.
- 100: ≥\$500 b (in excess of 1% of present OECD GDP p.a.)

On this issue the Exchange Model forecasts the development of a broad consensus close to point 75 on the policy scale, corresponding to an amount of \$375bn per annum. A few stakeholders – notably ALBA, the African group and the LDCs – will continue to press for more funds.

Ambition 2050

What mitigation goal should be set for 2050?

- 0: No 2050 goal
- 20: Qualitative goal
- 30: Qualitative goal with a roadmap
- 50: Goal of 40% GHG reduction relative to 2010
- 70: Goal of 70% GHG reduction relative to 2010
- 100: Goal of zero net emissions

The Exchange Model forecasts the development of a broad consensus close to point 70 on the scale, corresponding to a goal of 70 percent of GHG reduction relative to 2010.

Ambition 2100

What mitigation goal should be set for 2100?

- 0: No 2100 goal
- 20: Qualitative goal
- 30: Qualitative goal with a roadmap
- 80: Goal of zero net emissions
- 100: Goal of negative net emissions

The Exchange Model forecasts that a broad consensus will emerge around point 90 on the policy scale, which includes a goal of zero net emissions by 2100, and some commitment to move beyond that.

Ambition Progression

What should be the mechanism for strengthening commitments over time?

- 0: No ambition mechanism
- 30: No backsliding principle
- 40: A non-binding progression principle
- 65: A binding progression principle
- 100: A binding commitment to strengthen targets in line with the 2 degrees goal

The Exchange Model forecasts that most stakeholders will converge to positions close to point 35 on the policy scale, representing a commitment not to reduce the level of ambition (no backsliding) with some in favour of a non-binding progression principle. India, however, will remain reluctant to accept such a principle.

Table 2 summarizes the Exchange Model's forecasts of the shifts in stakeholders' positions and of the associated negotiation outcomes.

Table 2. Summary of the Exchange Model's Forecasts

Issue	Predicted outcome on the policy scale	Description of outcome	Convergence in positions?
Differentiation	43 if convergence achieved	CBDR in the light of national circumstance	No. Brazil and Russia remain outliers
<i>Mitigation</i>			
MRV	57 if convergence achieved	ICA in a multilateral process with aspects of IAR	No. EU and China remain outliers
Mitigation - Legal Form	51	Binding agreement plus obligation to have (nonbinding) country-specific targets (INDCs)	Yes
EEA	21	EEA of aggregate ambition	Yes
<i>Adaptation</i>			
Adaptation- Legal Form	79	Non-binding country-specific commitments	Yes
Institutions	68	Strengthen existing institutions with new powers	Yes, although the Arab states remain reluctant
Reserved Financing	62	50% or more reserved for adaptation	Yes
Loss and Damage	14	Preambular reference only	Yes
<i>Finance</i>			
Who Pays?	44 if convergence achieved	A compromise would need to be defined that requires some degree of contributions from developing countries. We suggest a performance-based system could be a logical compromise.	No. Arab states and EU remain outliers
Amount	77	Approx \$375bn p.a. by 2030 from public and private sources	Yes
<i>Ambition</i>			
2050	72	Goal of 70% GHG reduction relative to 2010	Yes
2100	92	Goal of zero net emissions with some reference to repairing damage	Yes
Progression	35	No backsliding (with possibility of nonbinding progression)	Yes, although India remains reluctant to accept the principle

4. Carving Out Issues Makes Agreement More Difficult

As noted above, these analyses assume that the stakeholders are in principle willing to make trade-offs across all issues. The negotiators may, however, carve out or compartmentalize the negotiation issues, dealing with some subsets of issues separately. In some negotiations this can be a wise approach, but in this case carving out substantively related issues in this way makes the challenge of reaching agreement more difficult. We ran additional scenarios in which the financial issues, the ambition issues and the remaining issues are dealt with separately. Table 3 summarizes the results, which show that the number of issues that become potential obstacles to an agreement increases from three to nine.

Carving out makes it even more difficult to reach agreement on the issue of Finance-Who Pays? Instead of only the Arab states and the EU being outliers from the emerging compromise, Brazil and China join the Arab states and the EU are outliers. To the extent that a consensus develops on this issue, it involves obligations to contribute for developed countries only. The volume of finance also becomes a more difficult issue to resolve if the financial issues are dealt with in isolation.

Carving out the issues relating to levels of ambition also makes it more difficult to reach an agreement on these issues. There is little movement from the stakeholders' current positions.

Table 3. Summary of the Exchange Model's Forecasts Assuming Carving Out of Issues

Issue	Predicted outcome on the policy scale	Description of outcome	Convergence in positions?
Differentiation	40 if convergence achieved	CBDR in the light of national circumstance	No. Brazil and Russia remain outliers
<i>Mitigation</i>			
MRV	69 if convergence achieved	International Assessment and Review	No. EU, Japan and China remain outliers
Mitigation -Legal Form	58	Binding agreement plus obligation to have (nonbinding) country-specific targets (INDCs)	Yes
EEA	24	EEA of aggregate ambition	Yes
<i>Adaptation</i>			
Adaptation-Legal Form	79	Non-binding country-specific commitments	Yes
Institutions	64	Strengthen existing institutions with new powers	Yes, although the Arab states remain reluctant
Reserved Financing	74	50% or more reserved for adaptation	Yes, although India and AILAC continue to call for stronger reserves
Loss and	15	Preambular reference only	Yes

<i>Damage</i>			
<i>Finance</i>			
Who Pays?	20 if convergence achieved	Some developing countries invited to contribute	No. Arab states, Brazil, China and EU remain outliers
Amount	68 if convergence achieved	Approx \$350bn p.a. by 2030 from public and private sources	No. Africa group, AILAC, ALBA, AOSIS and Russia remain outliers
<i>Ambition</i>			
2050	64 if convergence achieved	Somewhat less than goal of 70% GHG reduction relative to 2010	No. Little movement from initial positions
2100	91 if convergence achieved	Goal of zero net emissions with some reference to repairing damage	No. Little movement from initial positions
Progression	56 if convergence achieved	Clear commitment to progression principle	No, India remains reluctant while LDCs and African group continue to call for stronger commitment

5. Concluding Remarks

The analyses presented here give reason for cautious optimism regarding the outcome of Paris 2015. On ten of the thirteen main controversial issues we forecast the emergence of broad consensus among the main stakeholders, and the expected compromises represent substantial progress in the global governance of climate change. These forecasts assume, however, that all of the issues are kept on the agenda at the same time during the conference. If the negotiators decide to carve out certain issues and deal with them separately, reaching an agreement will be far more difficult. There are, moreover, three issues that will be particularly challenging to resolve: Differentiation; Mitigation MRV; and Finance Who Pays? We gave details of the specific stakeholders that will have particular objections to the emerging compromises on each of these issues. We also forecasted that Brazilian and Chinese representatives will perceive losses from the negotiation process. These stakeholders therefore need to be offered good reasons, if necessary in the form of special provisions, to accept the agreement that emerges.

This study is part of a larger research project involving Professor Bruce Bueno de Mesquita (New York University), Professor Detlef Prinz (Potsdam University) and several researchers at the Oslo Climate Institute Cicero. Our colleagues are applying a range of complementary approaches to forecasting the process and outcomes of Paris 2015. These include the application of the non-cooperative game theoretic model by Professor Bueno de Mesquita of NYU. Another approach involves the systematic collection of experts' predictions of the negotiation outcomes. After the conference has been held, we intend to return to our forecasts to assess their accuracy and usefulness.

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- Thomson, R., F.N. Stokman, C. Achen, and T. Koenig. eds. 2006. *The European Union Decides*. Cambridge: Cambridge University Press.

Appendix

Graphs of the remaining issues on which the Exchange Model forecasts convergence.

Ex Ante Assessments

The issue of Ex Ante Assessments (EEAs) concerns the provisions to be included for assessment and review of the nationally determined contributions. The main alternatives on the 0-100 policy scale are:

0: Option 1: No EAA

20: Option 2: EAA of aggregate ambition

60: Option 3: EAA of aggregate ambition and technical EAA of individual INDCs (transparency, clarity, comparability, etc.)

90: Option 4: Option 3 plus a political assessment of individual INDCs (ambition and equity/fairness)

100: Option 5: Option 4 and a formal mechanism for involving inputs from civil society

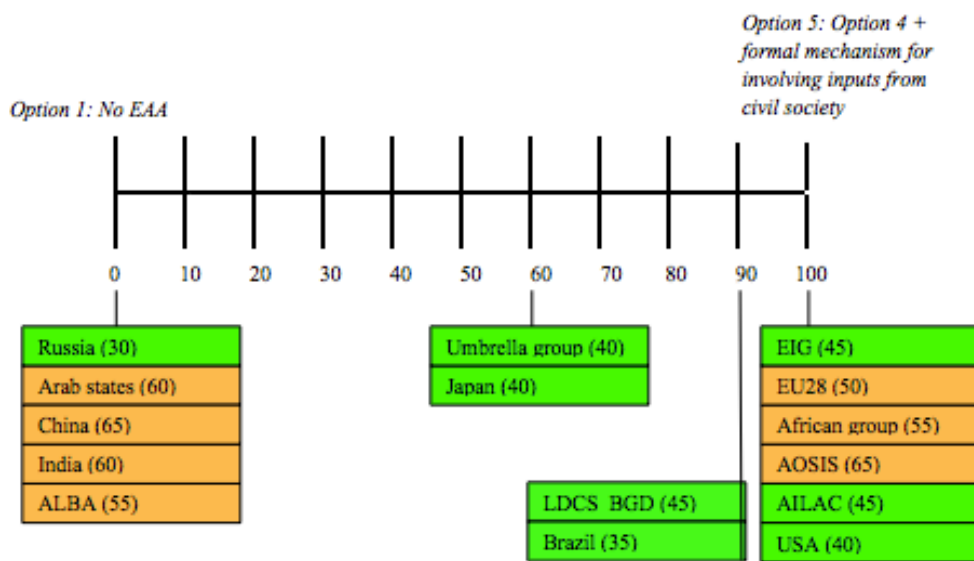


Figure 11. Stakeholders' Positions on the Issue of Ex Ante Assessments

Note: Salience scores in parentheses

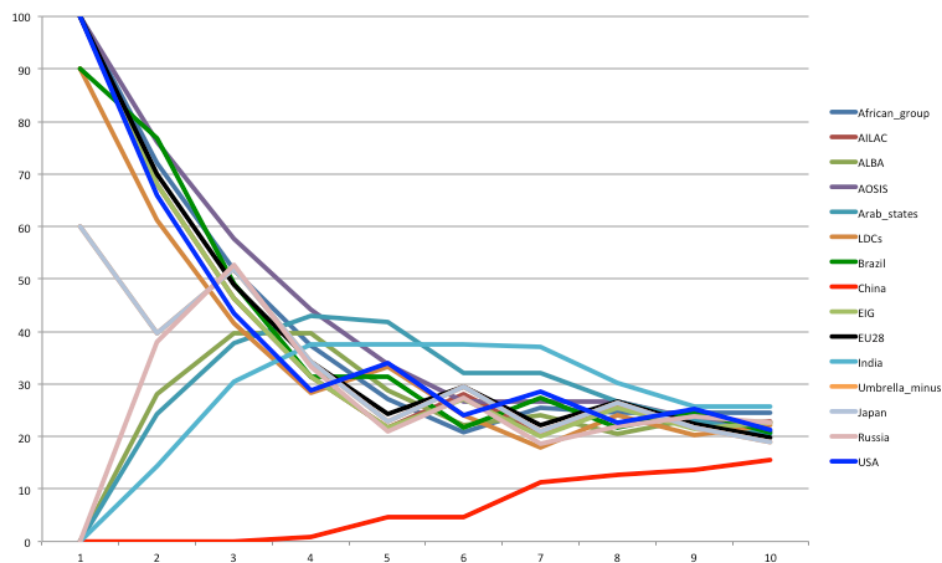


Figure 12. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Ex Ante Assessments

Adaptation Legal Form

This issue focuses on the question of the extent to which countries' new commitments to adaptation targets should be country-specific and legally binding. The alternatives on the 0-100 policy scale are:

0: No new commitments to adaptation

40: Collective, non-binding provisions. E.g. "all parties are encouraged to integrate adaptation into their national plans"

80: Non-binding country-specific commitments

100: Legally binding country-specific commitments

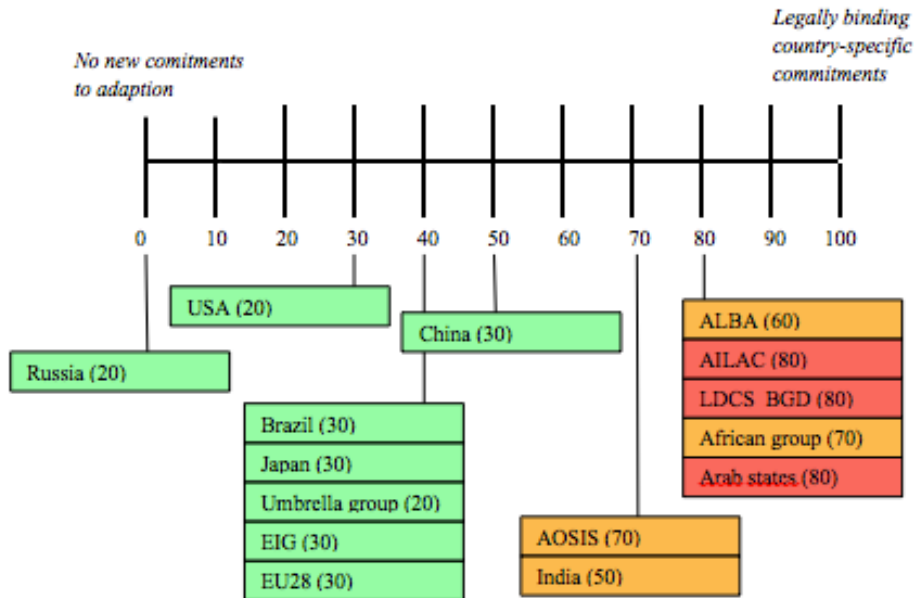


Figure 13. Stakeholders' Positions on the Issue of Adaptation Legal Form

Note: Salience scores in parentheses

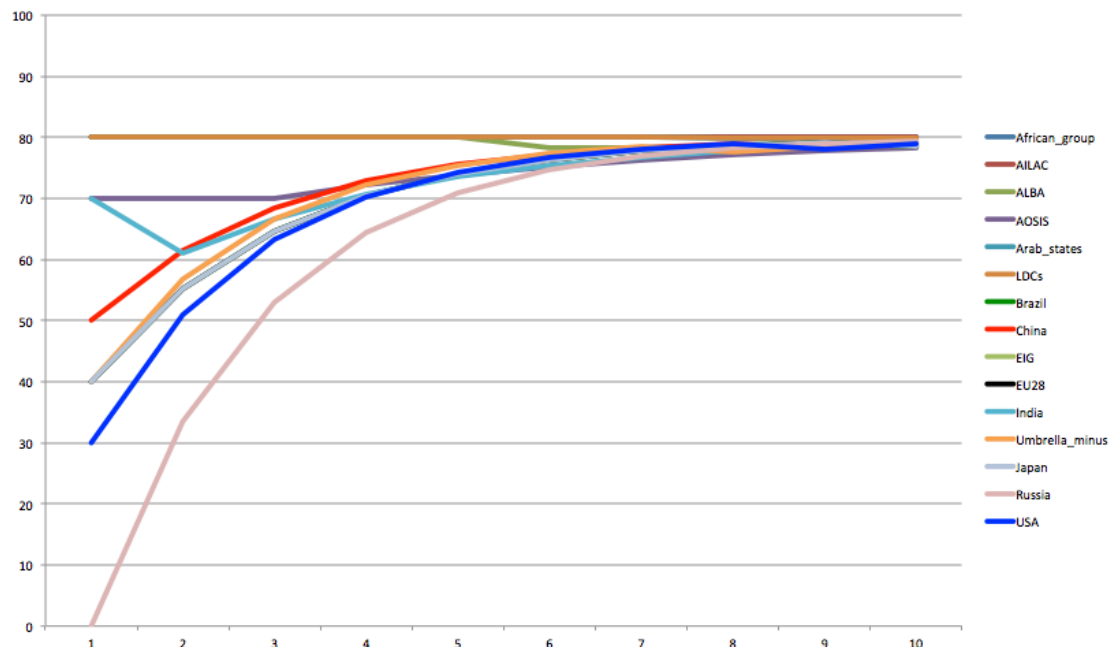


Figure 14. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Adaptation Legal Form

Adaptation Institutions

To what extent should the institutional framework for adaptation be strengthened? Here, the positions on the 0-100 policy scale are:

0: No strengthening

60: Strengthen present institutions (stronger mandate, funding and knowledge platform)

80: Establish new institutions stronger than present ones.

100: Establish subsidiary body on adaptation

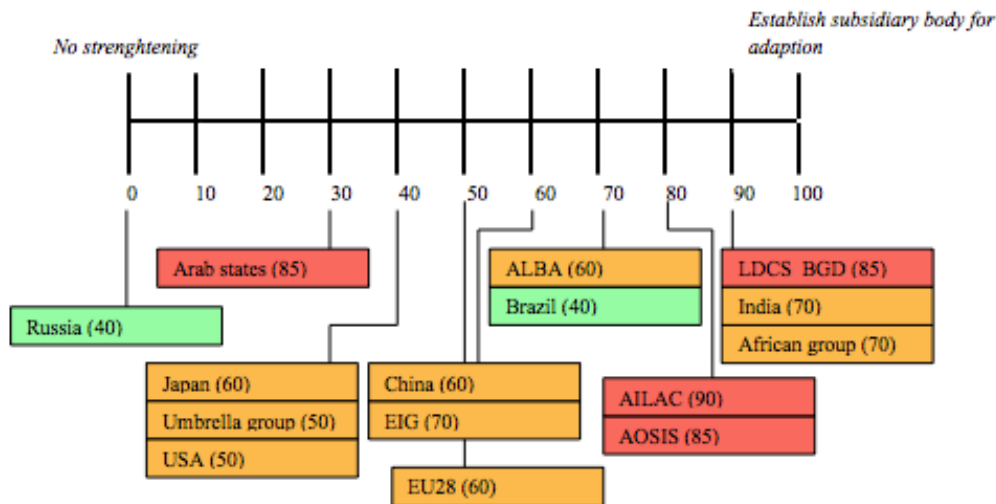


Figure 15. Stakeholders' Positions on the Issue of Adaptation Institutions

Note: Salience scores in parentheses

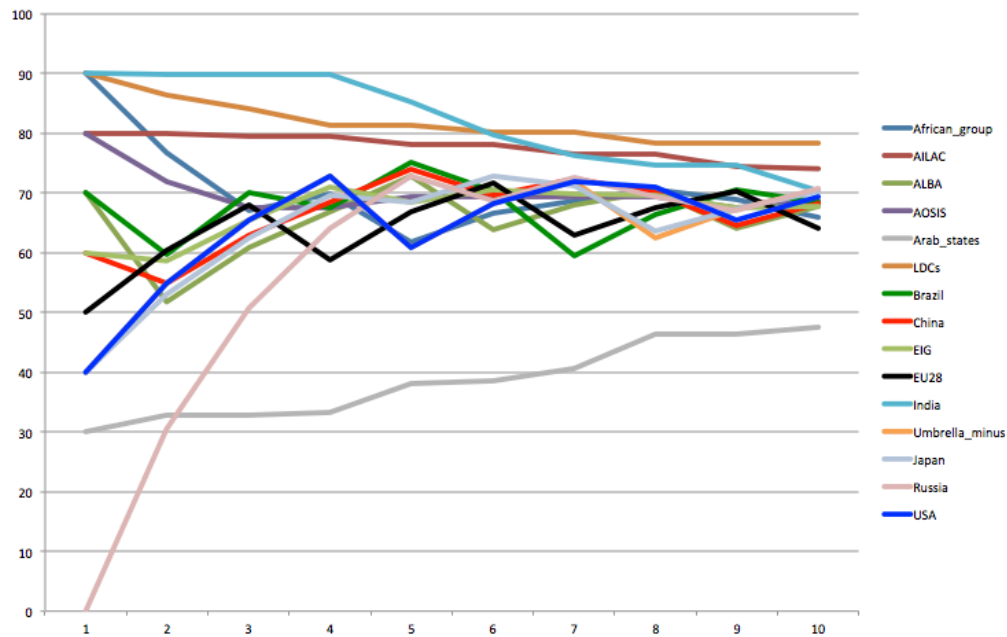


Figure 16. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Adaptation Institutions

Adaptation Reserved Financing

To what extent should funds be reserved for adaptation?

0: No earmarking for adaptation

50: Approximately 50% earmarked for adaptation

100: Dedicated levy for adaptation

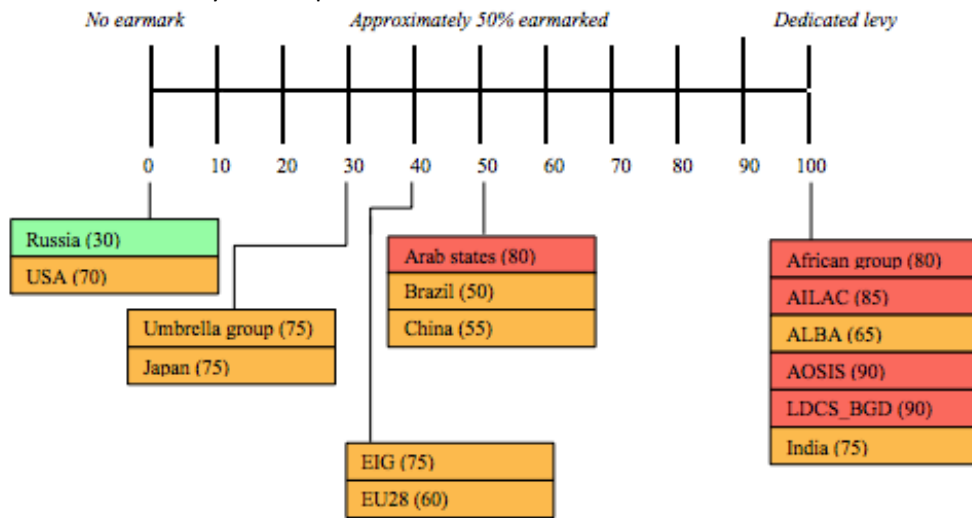


Figure 17. Stakeholders' Positions on the Issue of Adaptation Reserved Financing

Note: Salience scores in parentheses

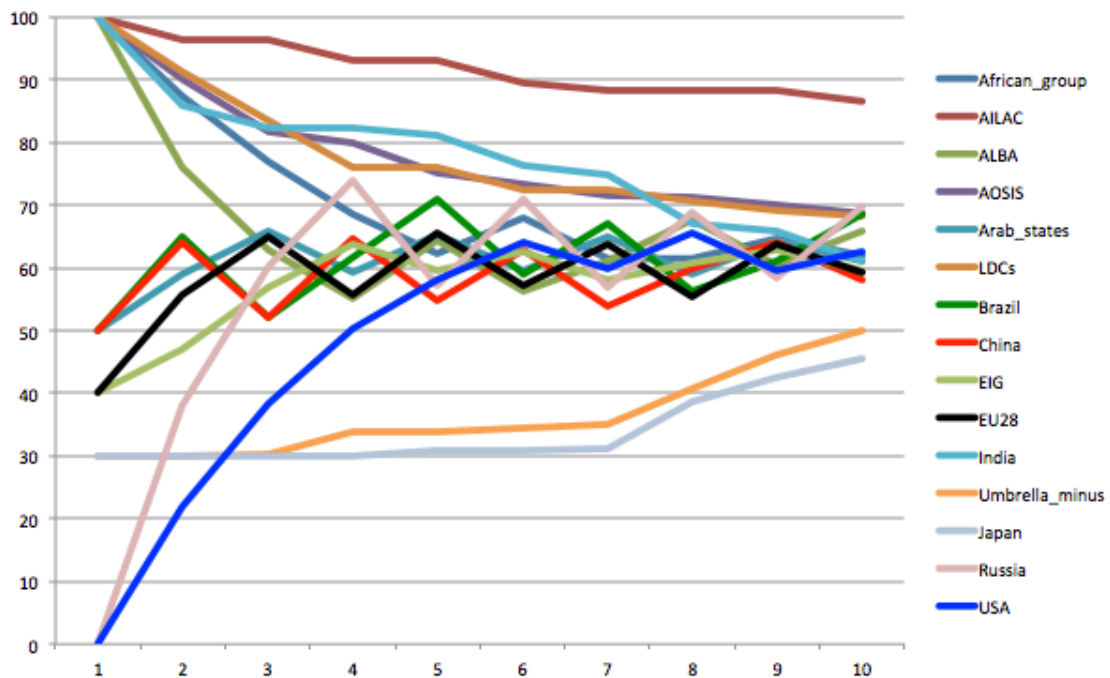


Figure 18. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Adaptation Reserved Financing

Loss and Damage

To which degree will loss & damage (L&D) be included in an agreement?

- 0: No mention/omission of L&D
- 10: Preambular reference only
- 20: Reference to Warsaw International Mechanism (WIM) (under adaptation)
- 30: Separate chapter on L&D with little substance
- 40: Separate chapter on L&D and new institutional arrangements with little substance
- 50: Separate chapter on L&D and new institutional arrangements with new non-financial elements (such as coordination and capacity-building)
- 70: Separate chapter on L&D and new mechanism with new non-financial and financial elements (such as insurance) but no compensation regime
- 100: Separate chapter on L&D and new non-financial and financial elements, including a compensation regime

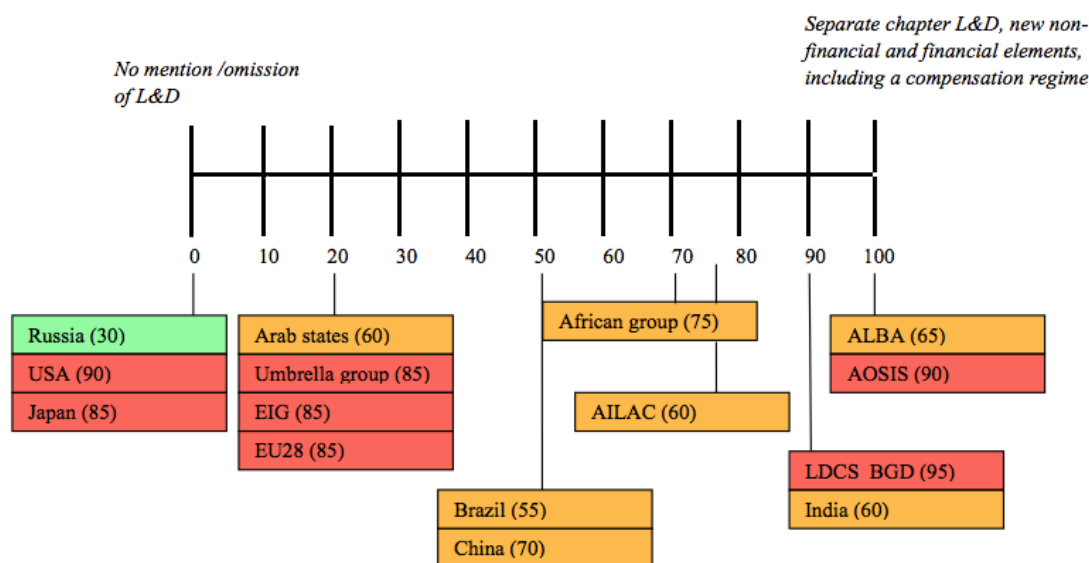


Figure 19. Stakeholders' Positions on the Issue of Loss and Damage

Note: Saliense scores in parentheses

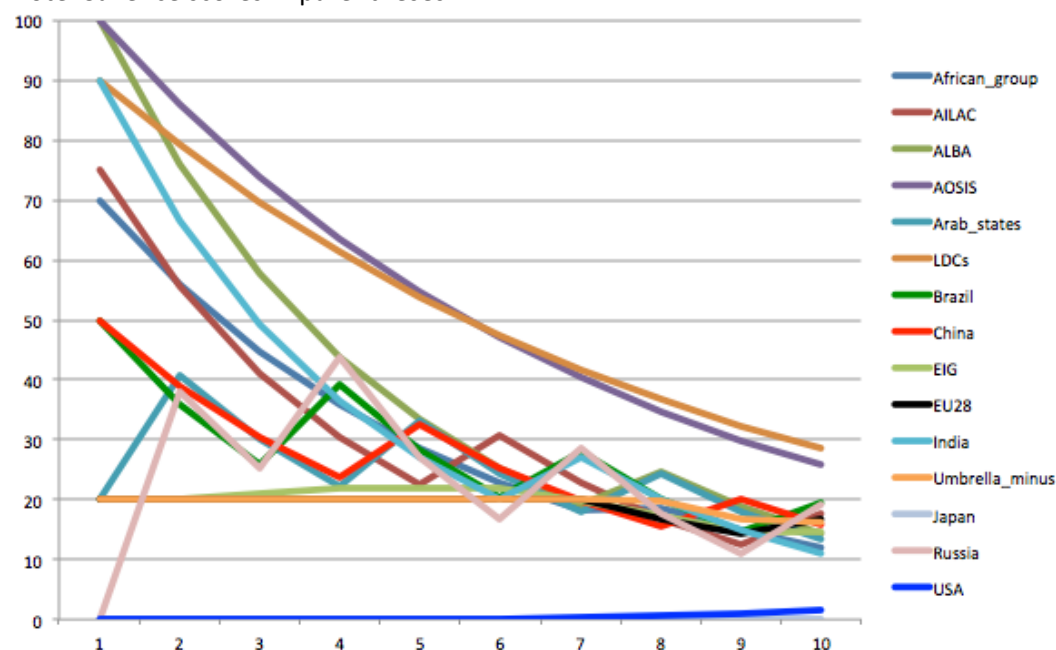


Figure 20. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Loss and Damage

Finance Amount

What amount of funds should be mobilized (private and public) by 2030 (p.a.)?

0: no new target (i.e. \$100b p.a.)

20: Unspecified increase above \$100b p.a.

40: \$ 200b p.a.

60: \$ 300b p.a.

80: \$ 400b p.a.

100: ≥\$500 b (in excess of 1% of present OECD GDP p.a.)

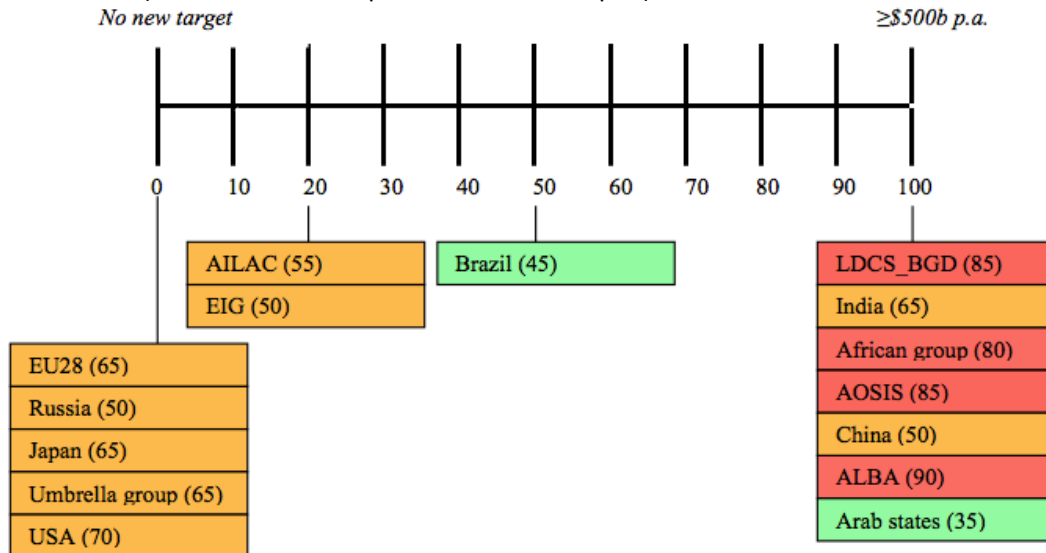


Figure 21. Stakeholders' Positions on the Issue of Finance Amount

Note: Salience scores in parentheses

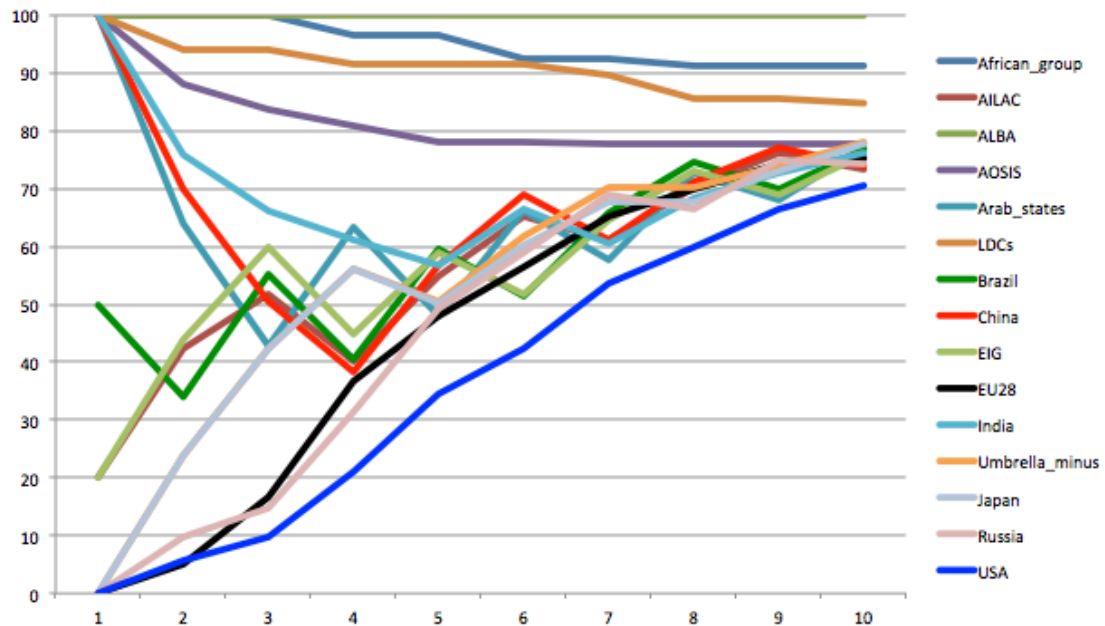


Figure 22. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Finance Amount

Ambition 2050

What mitigation goal should be set for 2050?

0: No 2050 goal

20: Qualitative goal

30: Qualitative goal with a roadmap

50: Goal of 40% GHG reduction relative to 2010

70: Goal of 70% GHG reduction relative to 2010

100: Goal of zero net emissions

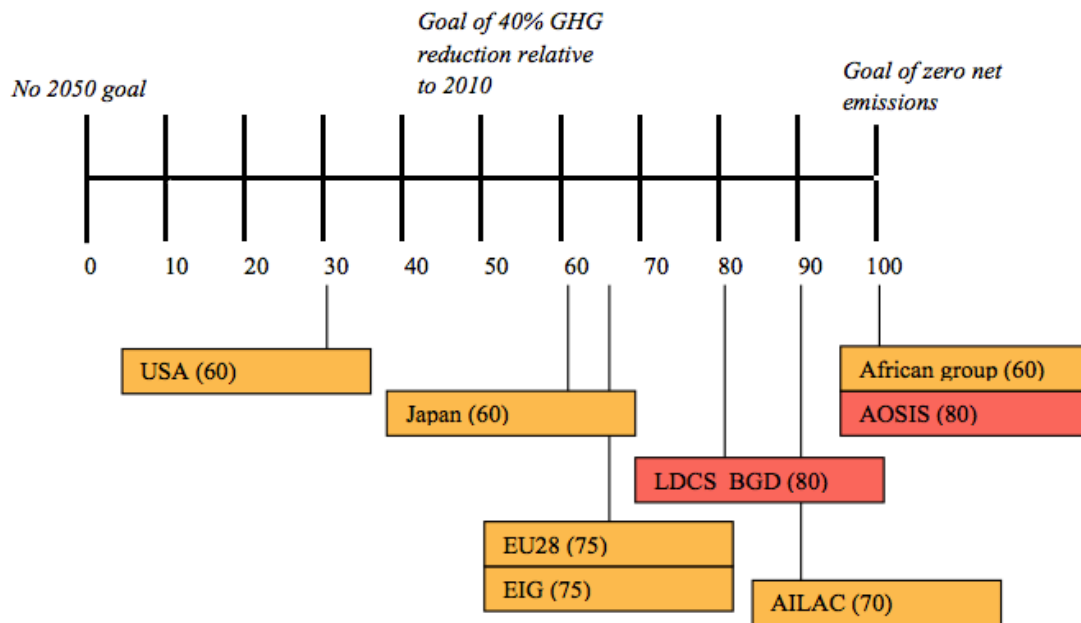


Figure 23. Stakeholders' Positions on the Issue of Ambition 2050

Note: Salience scores in parentheses

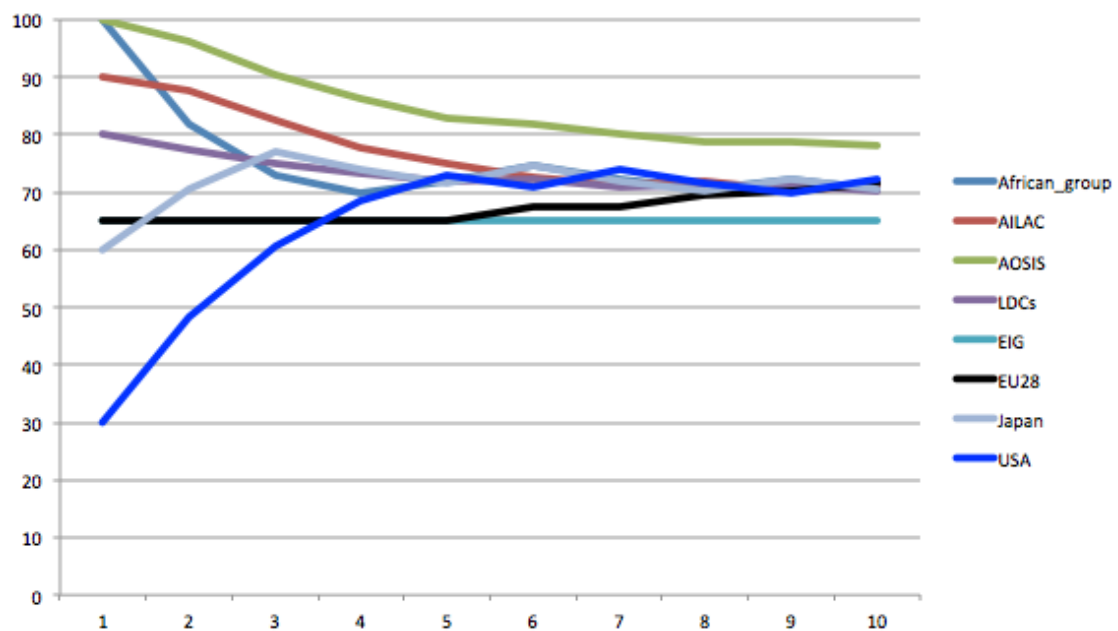


Figure 24. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Ambition 2050

Ambition 2100

What mitigation goal should be set for 2100?

0: No 2100 goal

20: Qualitative goal

30: Qualitative goal with a roadmap

80: Goal of zero net emissions

100: Goal of negative net emissions

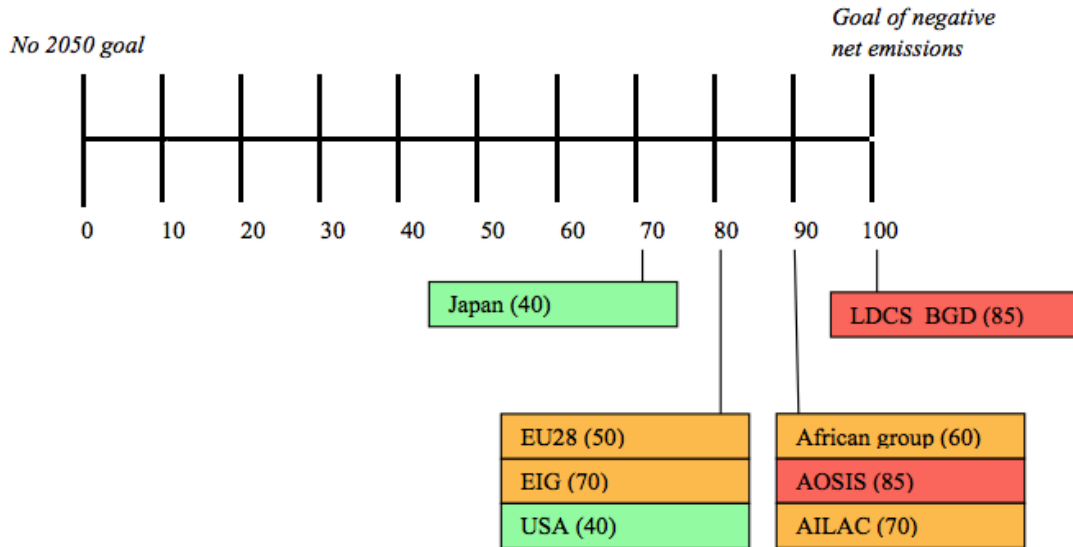


Figure 25. Stakeholders' Positions on the Issue of Ambition 2100

Note: Saliency scores in parentheses

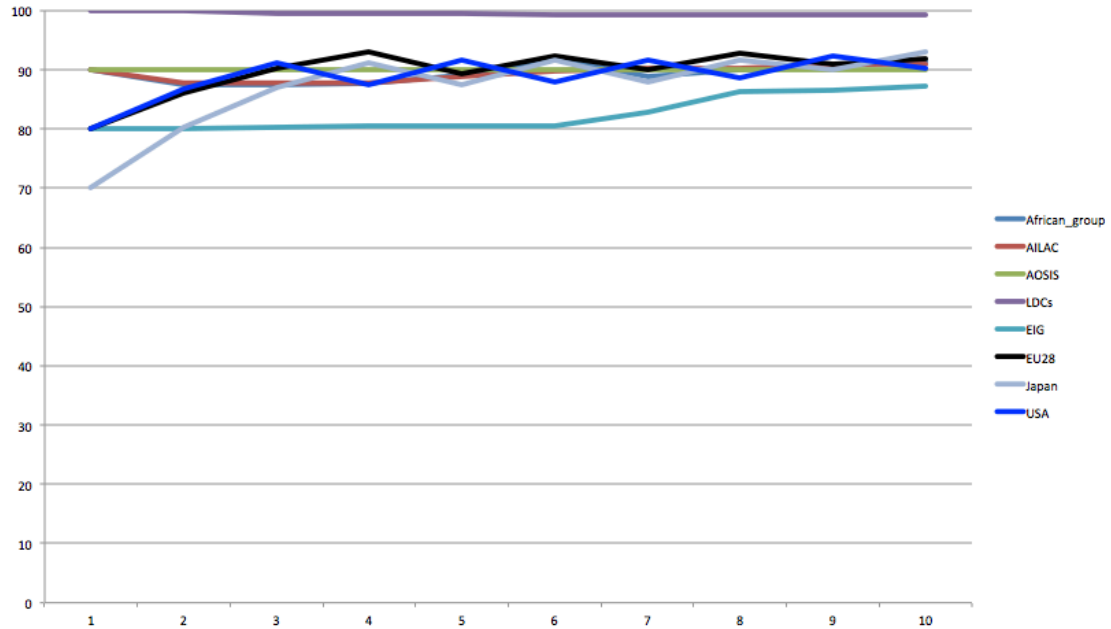


Figure 26. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Ambition 2100

Ambition Progression

What should be the mechanism for strengthening commitments over time?

0: No ambition mechanism

30: No backsliding principle

40: A non-binding progression principle

65: A binding progression principle

100: A binding commitment to strengthen targets in line with the 2 degrees goal

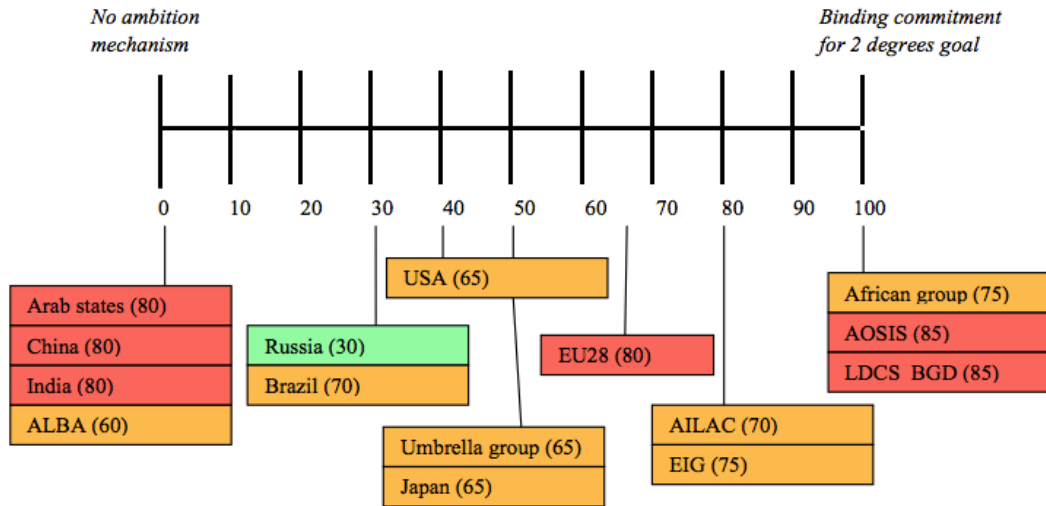


Figure 27. Stakeholders' Positions on the Issue of Ambition Progression

Note: Salience scores in parentheses

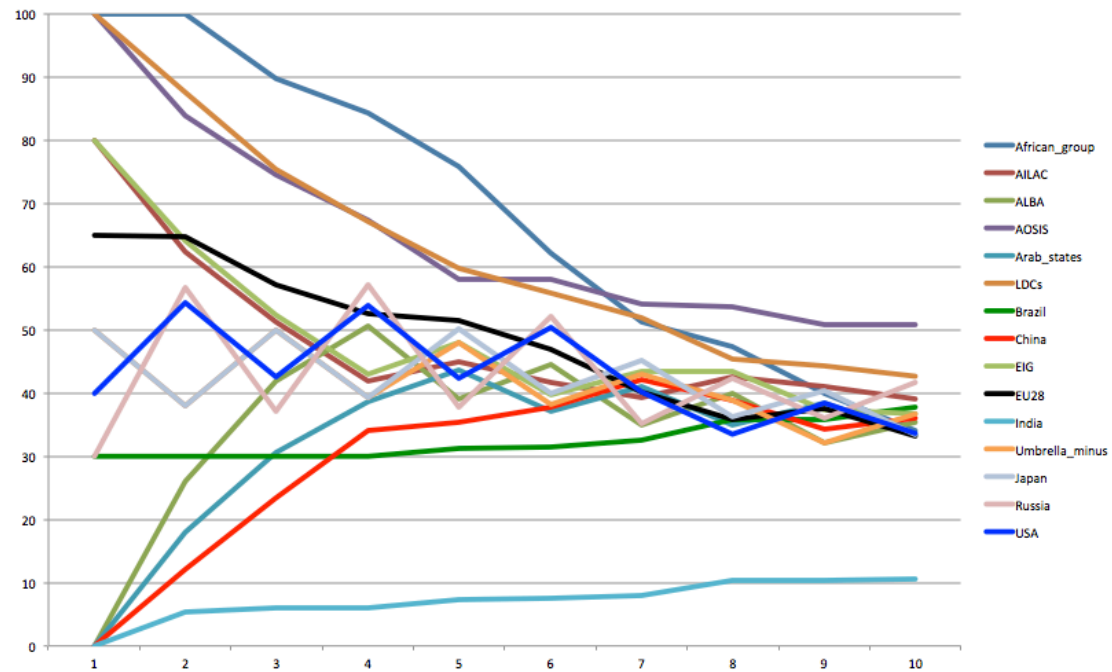


Figure 28. The Exchange Model's Forecasts on the Development of Stakeholders' Positions on the Issue of Ambition Progression