

# Tutorial ASONAM 2018

## Collective Decision Making: Processes and models

An Introduction

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Presentation August 2018

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# Collective decision Making

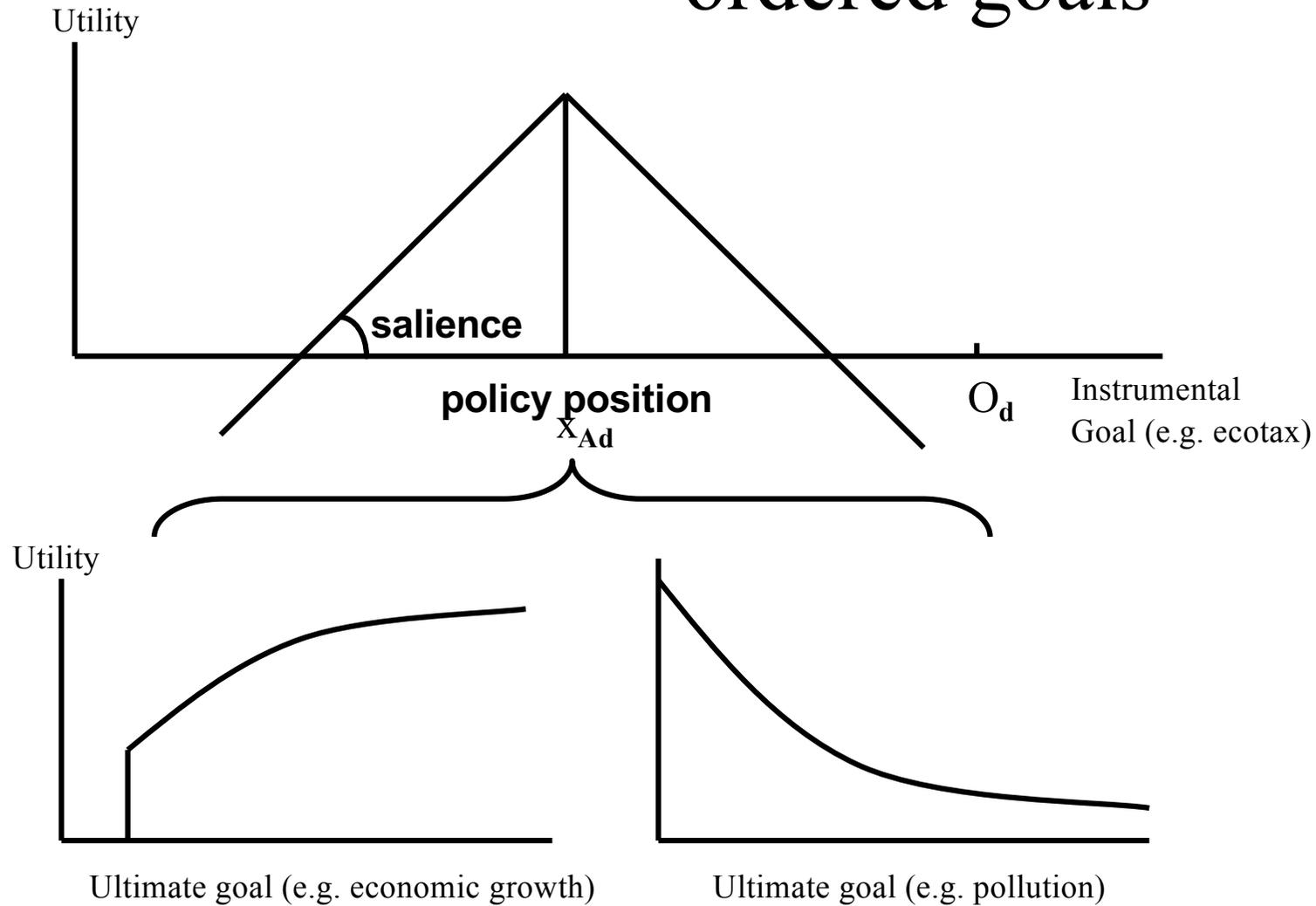
- **Two stages** (Mokken and Stokman 1976; Stokman and Van den Bos 1992):
  - first stage: influence aimed at building a *sufficiently large* coalition close to own *policy position*
  - second stage: voting based on *voting positions*, partly adapted during influence stage
- **Influence** in first phase determined by resources plus access
- **Power** in second phase determined by voting power

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# Instrumental and higher ordered goals



# Bargaining Processes

*Three fundamental bargaining processes, resulting in position changes and coalition building*

- **Persuasion**
  - Convincing information oriented towards cooperative solutions for all stakeholders
  - (**information and trust networks** dominant)
- **Exchange**
  - Cooperative bilateral deals oriented towards profitable solutions for both partners (possibly with negative externalities for others)
  - (**exchange networks** dominant)
- **Enforcement**
  - (**power networks** dominant)

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<i><b>Fundamental Processes</b></i>	<i><b>Dominant Networks</b></i>	<i><b>Integrated Approach</b></i>	<i><b>Conditions for process to dominate</b></i>
<i><b>Persuasion</b></i>	Information Networks	Cooperative Nash Bargaining Solution for all relevant actors	1.Reversal point very unattractive 2.Overall coalition possible/sub coalitions difficult to form 3.Risk averse actors
<i><b>Logrolling</b></i>	Negotiated Exchange Networks	Voting position exchange model (Cooperative solutions for subsets of actors with positive and/or negative externalities for others)	Opposite positions and complementary interests
<i><b>Enforcement</b></i>	Hierarchical/ Power Networks	(Non-cooperative) Challenge model	Opposite positions and non-complementary interests

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# Nash Bargaining Solution for all actors involved

If:

- Reversal point is very undesirable (very high costs of no agreement)
- The grand coalition is possible but firm coalitions among subsets are difficult to construct
- The loss function is quadratic around policy position

An approximation of the Nash Bargaining Solution (NBS) is:

$$O_d = \frac{\sum_{i=1}^n C_{id} S_{id} X_{id}}{\sum_{i=1}^n C_{id} S_{id}}$$

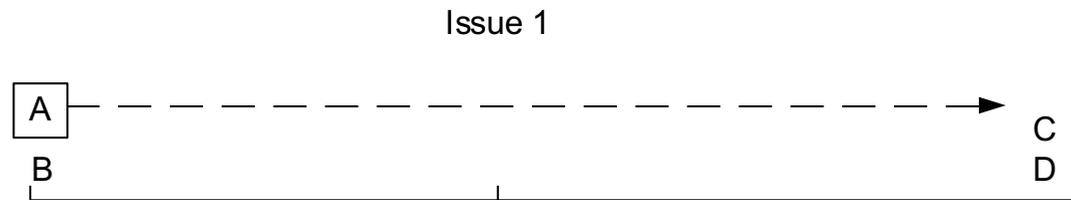
Christopher H. Achen, Institutional realism and bargaining models. In Robert Thomson et al. The European Union Decides, Cambridge: Cambridge University Press 2006, Pp. 86-123

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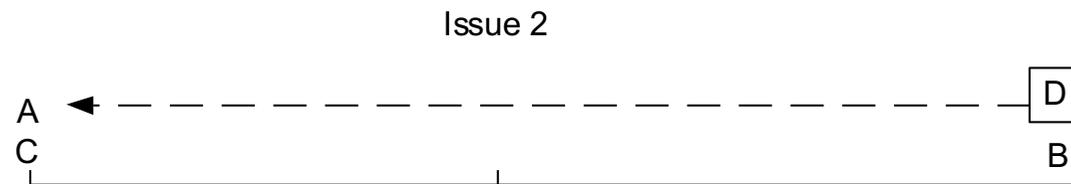


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# Exchanging Voting Positions



O1 (NBS as expected outcome)



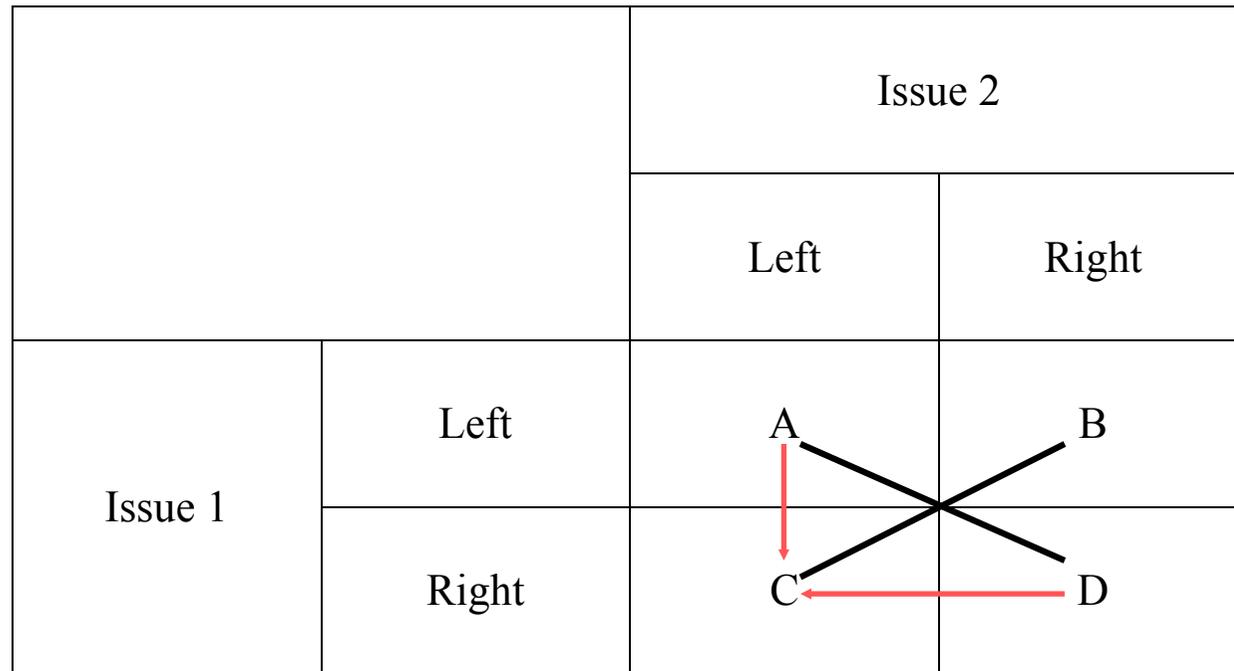
O2

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# Voting Position Exchange Possibilities



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# Exchange rates: Equal gain

- Equal gain
  - Assumes cardinal utility, invariant for affine transformations, quod non
  - Advantage: potential exchanges can be ordered and executed on the basis of utility gain for both exchange partners
  - Small variations in collective outcomes in case two potential exchanges generate the same utility gains for the exchange partners
  - No estimates of confident intervals for voting positions and outcomes

Stokman, Frans N., and Reinier Van Oosten, 1994

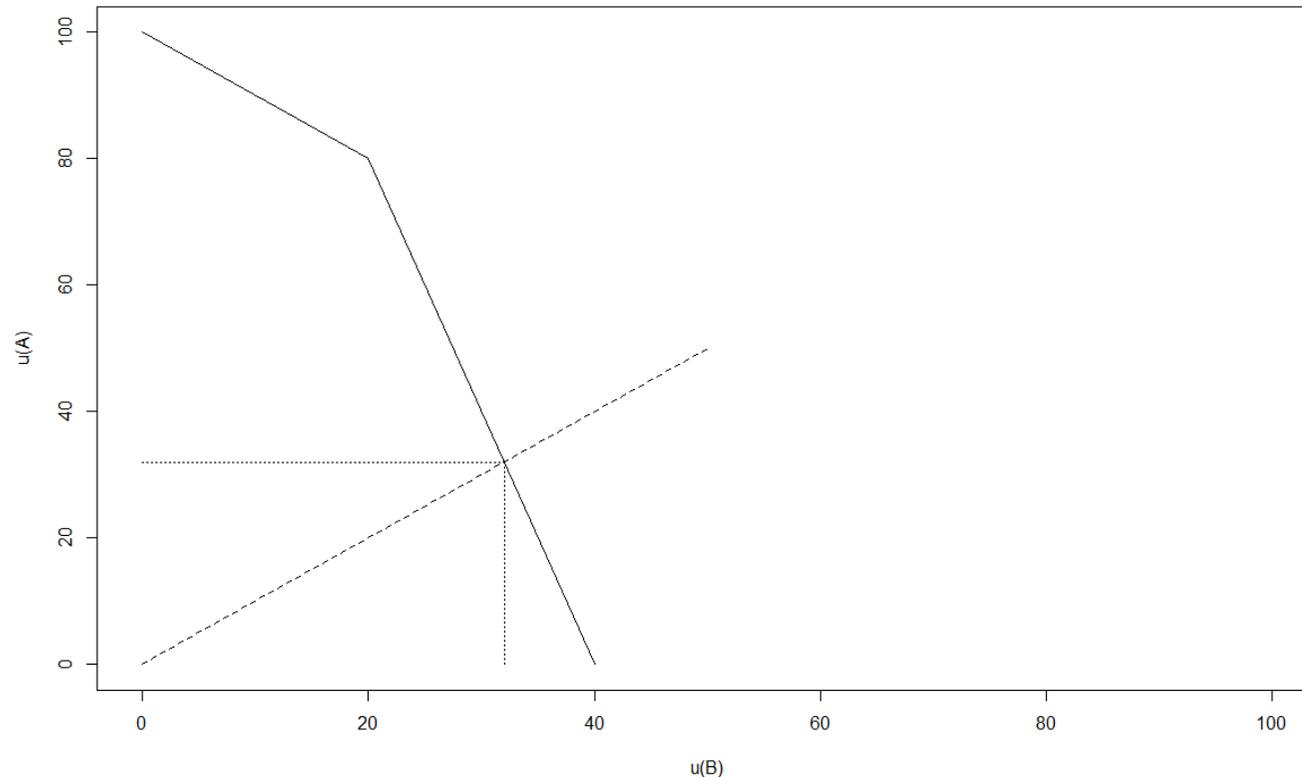
[The Exchange of Voting Positions: An Object-Oriented Model of Policy Networks](#), Bruce Bueno de Mesquita and Frans N. Stokman (eds), *European Community Decision Making: Models, Applications, and Comparisons*, New Haven: Yale University Press, 105-127

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# Random variation of gains: example (1)



Pareto frontier (PF) of *utilities*

Upper portion: B shifts all the way to A

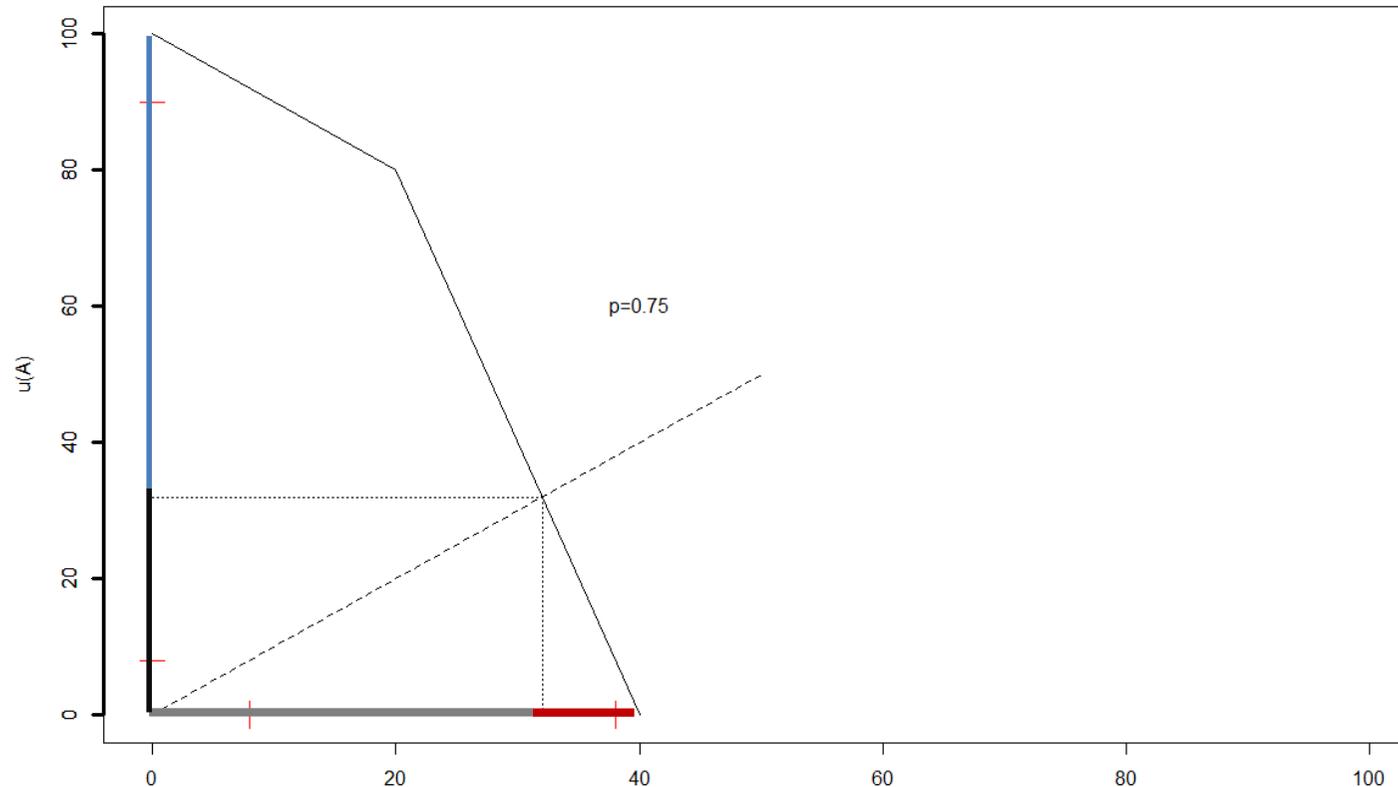
Lower portion: A shifts all the way to B

*Decide* (nonrandom) Equal Gain: 32 for both



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# Random variation of gains: example (2)



Random draw from 4 line segments:

1. Y-axis, *above* EG (below red bar)
2. Y-axis, *below* EG (above red bar)
3. X-axis, *left* of EG (right of red bar)
4. X-axis, *right* of EG (left of red bar)

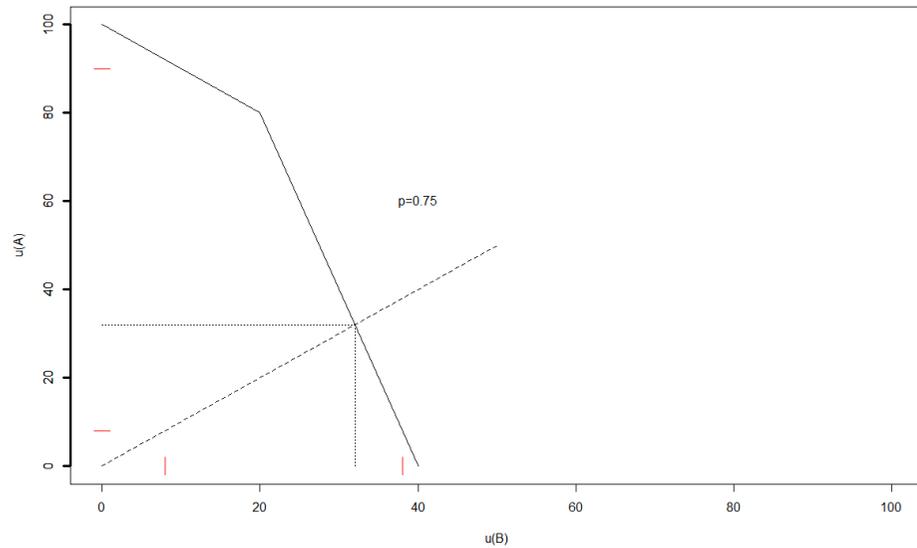
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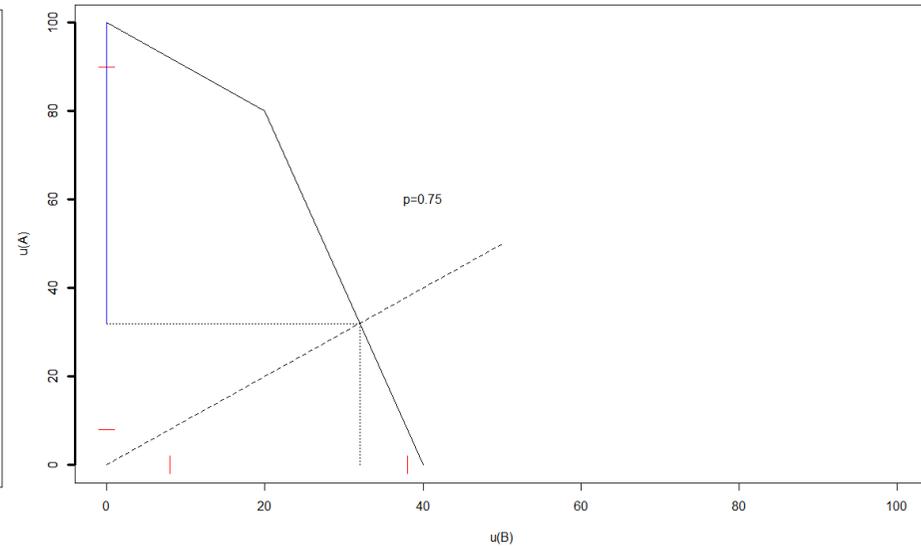
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Choice of  $p$  determines width of interval

# Random variation of gains: example (3)



Actor A is randomly chosen  
(y-axis in bold face)



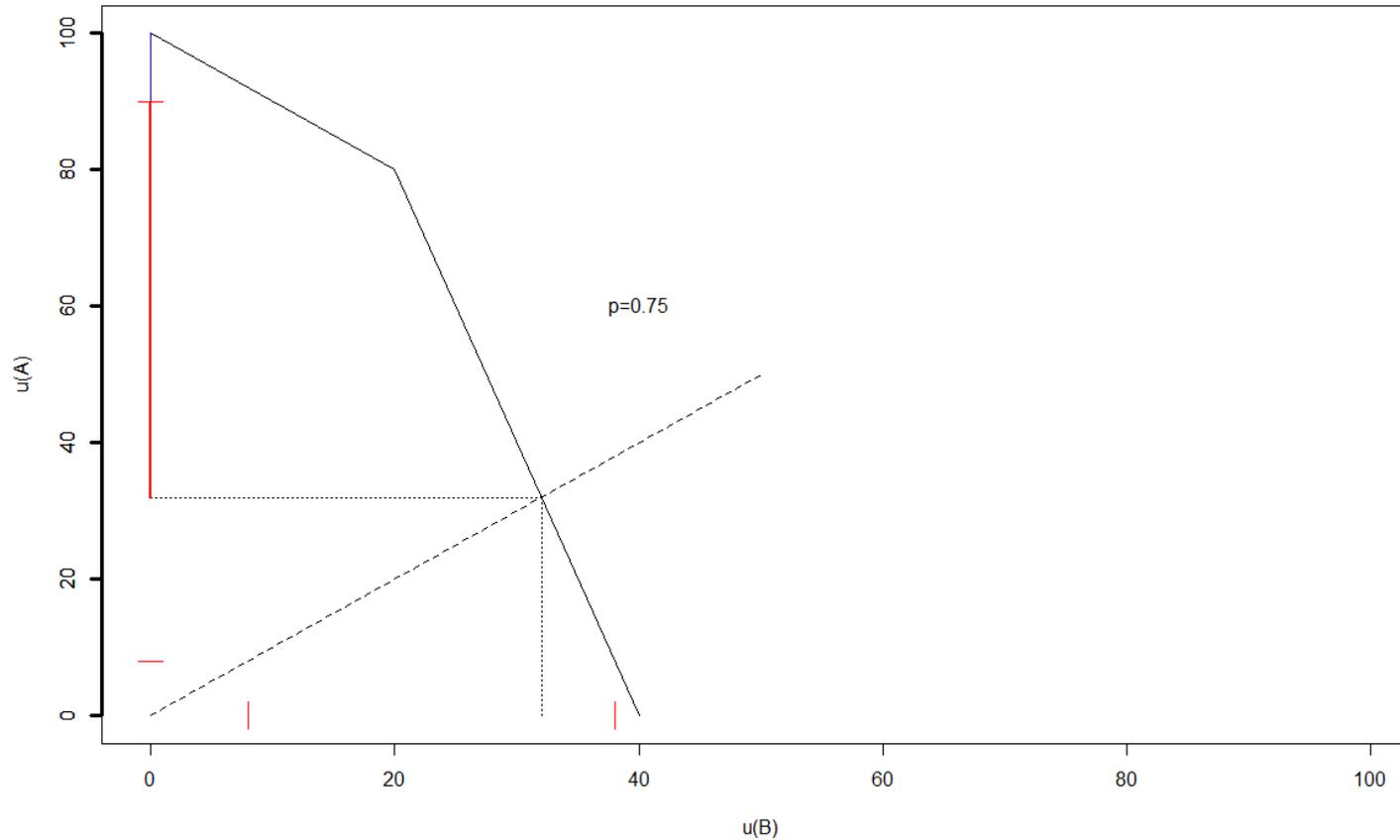
Actor A is randomly selected to win  
(blue line segment, *above EG*)

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# Random variation of gains: example (4)



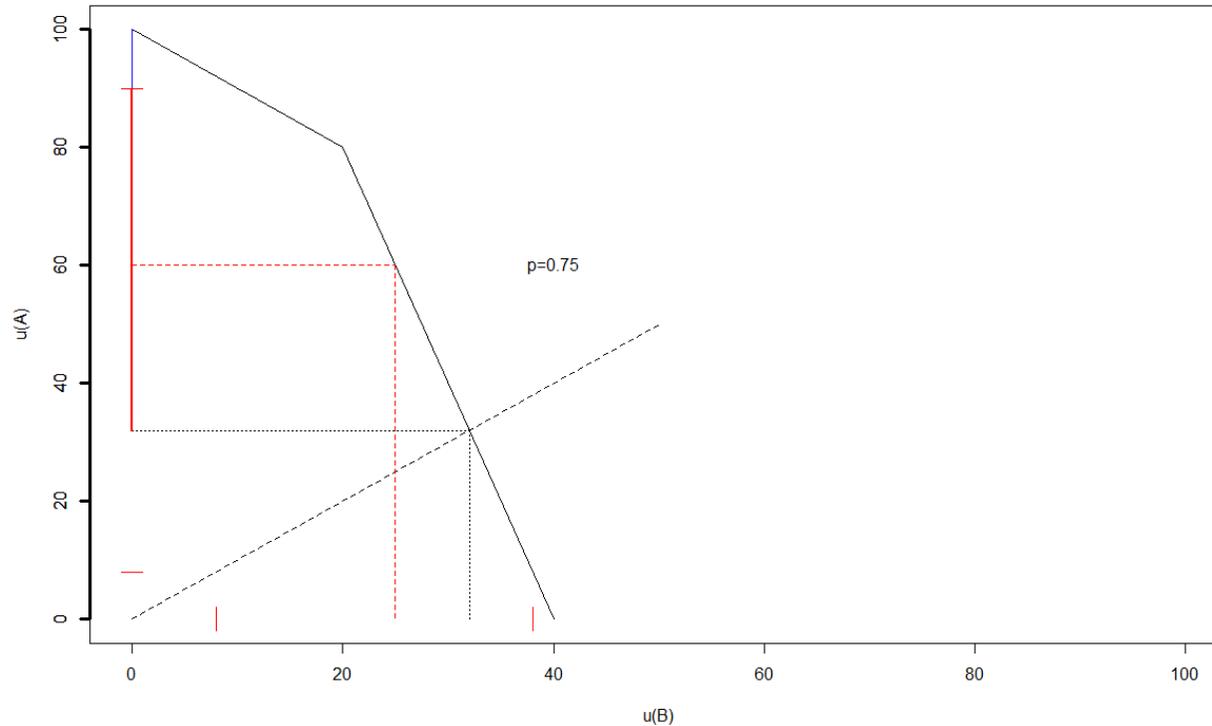
Utility interval for A shown by red line segment  
(bounded above by  $p$ )

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# Random variation of gains: example (5)



Random utility for A is 60, implying utility of 25 for B

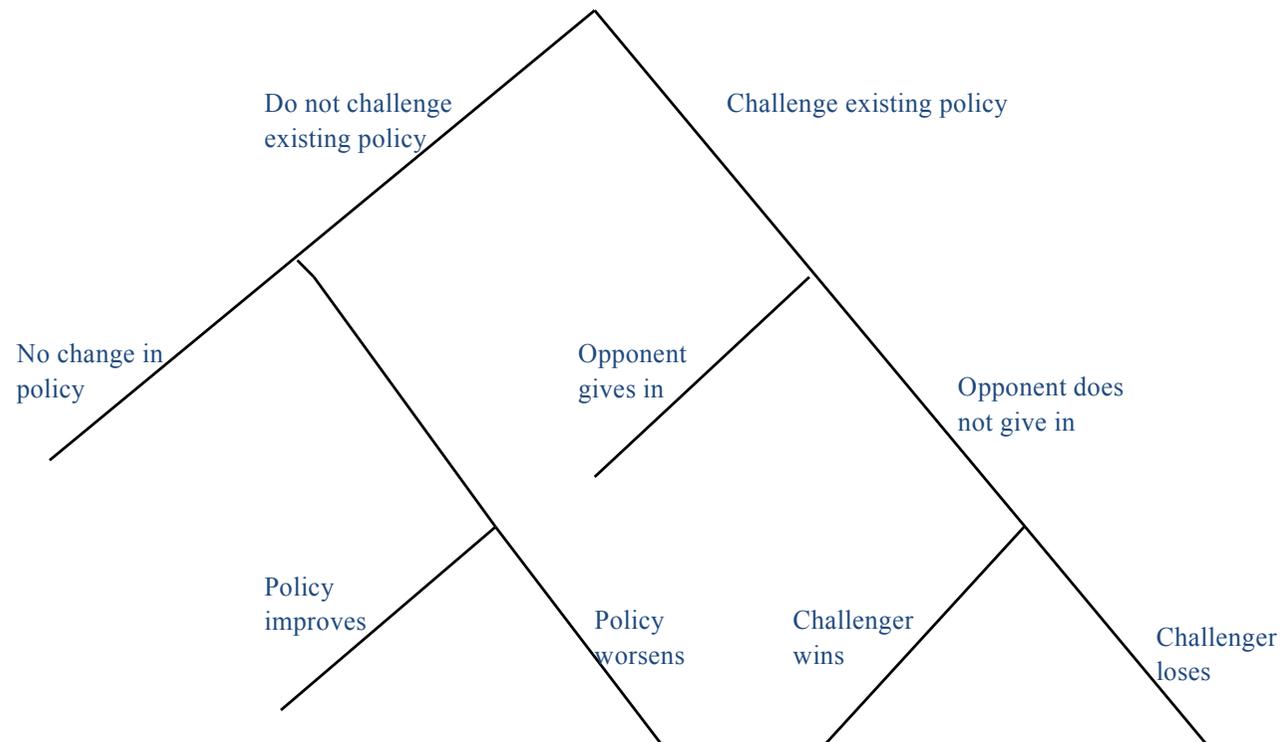
Jacob Dijkstra, Marcel Van Assen, Frans Stokman and Jelmer Draaijer  
*Random Variation of Exchange Rates in the Equal Utility Exchange Model*  
(Internal paper 2018)

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# Enforcement, based on voting rights and/or other power differences



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# Copenhagen Study

- Through interviews with two experts of Stockholm Environment Institute:
  - Determination of most controversial issues
  - Groups of COP Parties
  - Positions on and Salience for outcome close to own position for all COP Party Groups on all issues
  - Relative influence and salience for overall consensus
- Computer simulation for analysis of dynamic decision making process and optimal strategy

<http://stokman.org/artikel/15Stok.WasCopenhagenClimateTreatyPossible.pdf>

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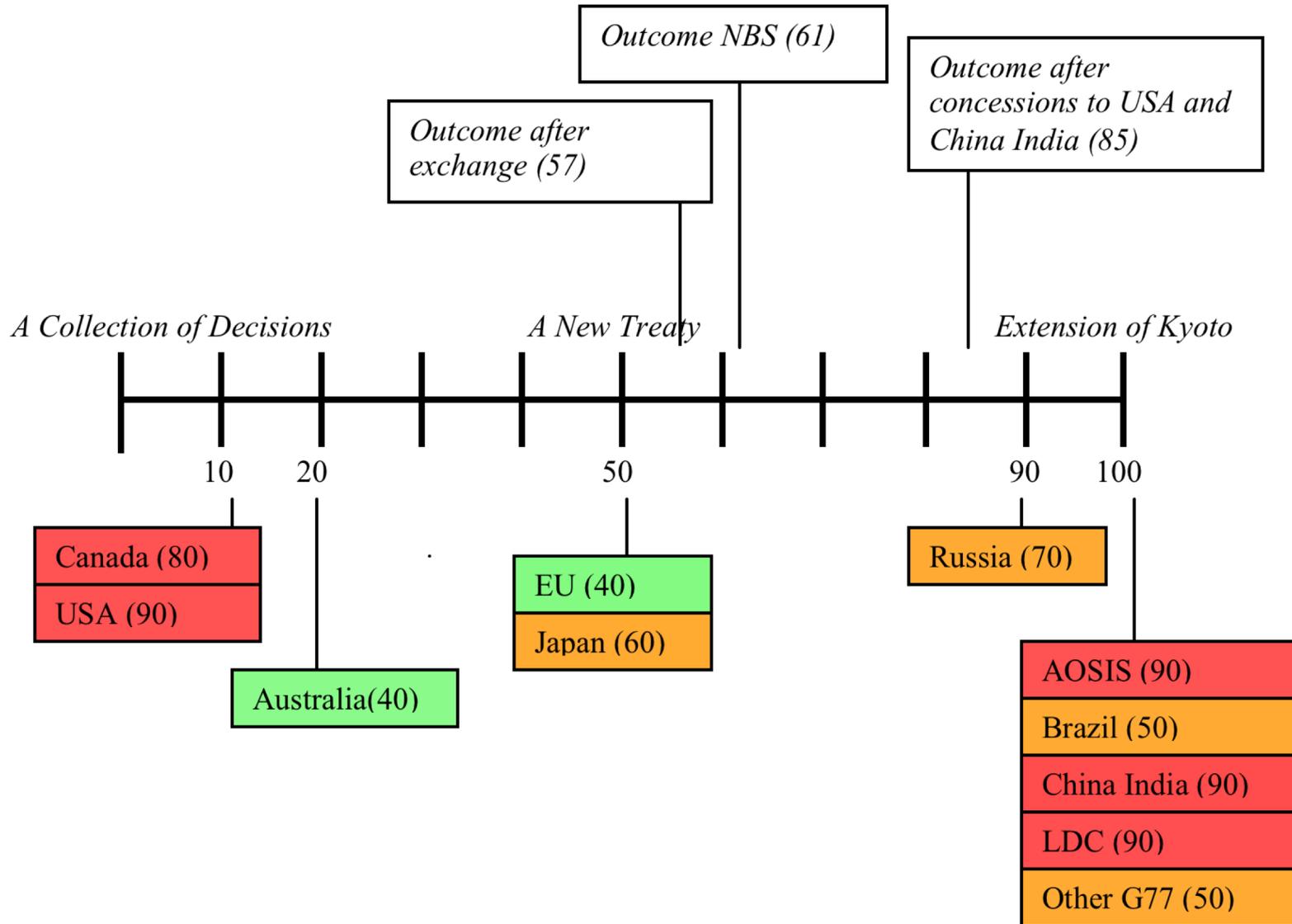
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**Table 1: Party Groups with Their Relative Influence and the Importance They Attach to Reaching an Overall Agreement.**

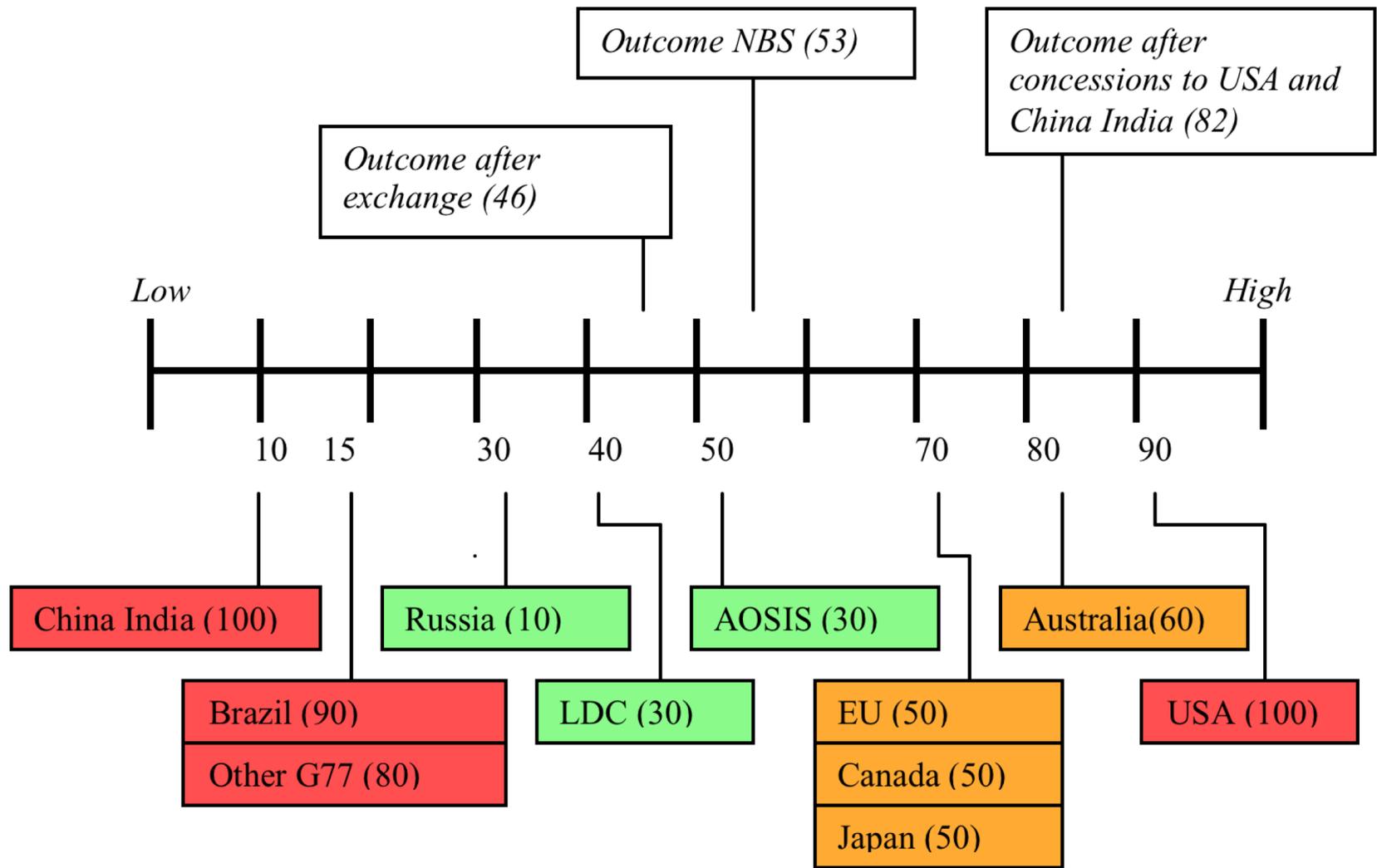
<i>Party Groups</i>	<i>Abbreviation</i>	<i>Relative Influence</i>	<i>Importance Attached to Reaching Agreement</i>
United States of America	<i>USA</i>	100	10
Canada	<i>Canada</i>	15	40
Australia	<i>Australia</i>	10	50
European Union	<i>EU</i>	60	90
Japan	<i>Japan</i>	20	60
Russia	<i>Russia</i>	5	10
China and India	<i>China India</i>	95	70
Brazil	<i>Brazil</i>	10	60
Least Developed Countries	<i>LDC</i>	30	85
Alliance Of Small Island States	<i>AOSIS</i>	30	90
G77 minus LDC, AOSIS, China, India, and Brazil.	<i>Other G77</i>	10	65

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Issue 1: New Decisions vs. Extension of Kyoto



## Expected outcomes based on NBS and Agreement Indicator

Issues	Expected outcomes based on <i>NBS</i>	Agreement Indicator
New Decisions vs. Extension of Kyoto (0 = New Decisions, 100 = Extension Kyoto)	61 (EU, Japan position)	59
CO <sub>2</sub> Reduction by Rich Countries in 2020 (0 = Low, 100 = High)	56 (Russia position)	68
Domestic CO <sub>2</sub> Emission Reduction (0 = Low, 100 = High)	30 (Australia, Canada position)	74
MRV CO <sub>2</sub> Reduction in Developing Countries (0 = Low, 100 = High)	53 (OASIS position)	65
Binding Commitments for Adaptation Fund (0 = Low, 100 = High)	47 (Russia position)	63
Adaptation Fund Discretion Power (0 = No, 100 = Yes)	52 (EU position)	70
Adaptation Fund: Aid or New and Additional (0 = Aid, 100 = New/Additional)	57 (EU, Russia position)	64

## Expected outcomes after realization of bilateral exchanges between Party Groups, and Agreement Indicator

Issues	Expected outcomes after bilateral exchanges	Agreement Indicator
New Decisions vs. Extension of Kyoto <i>(0 = New Decisions, 100 = Extension Kyoto)</i>	57 (EU, Japan position)	61
CO <sub>2</sub> Reduction by Rich Countries in 2020 <i>(0 = Low, 100 = High)</i>	70 (EU and Brazil position)	84
Domestic CO <sub>2</sub> Emission Reduction <i>(0 = Low, 100 = High)</i>	32 (Australia, Canada position)	89
MRV CO <sub>2</sub> Reduction in Developing Countries <i>(0 = Low, 100 = High)</i>	42 (LDC position)	64
Binding Commitments for adaptation fund <i>(0 = Low, 100 = High)</i>	36 (Russia position)	80
Adaptation Fund Discretionary Power <i>(0 = No, 100 = Yes)</i>	80 (China, Brazil position)	84
Adaptation Fund: Aid or New and Additional <i>(0 = Aid, 100 = New/Additional)</i>	93 (China India position)	93

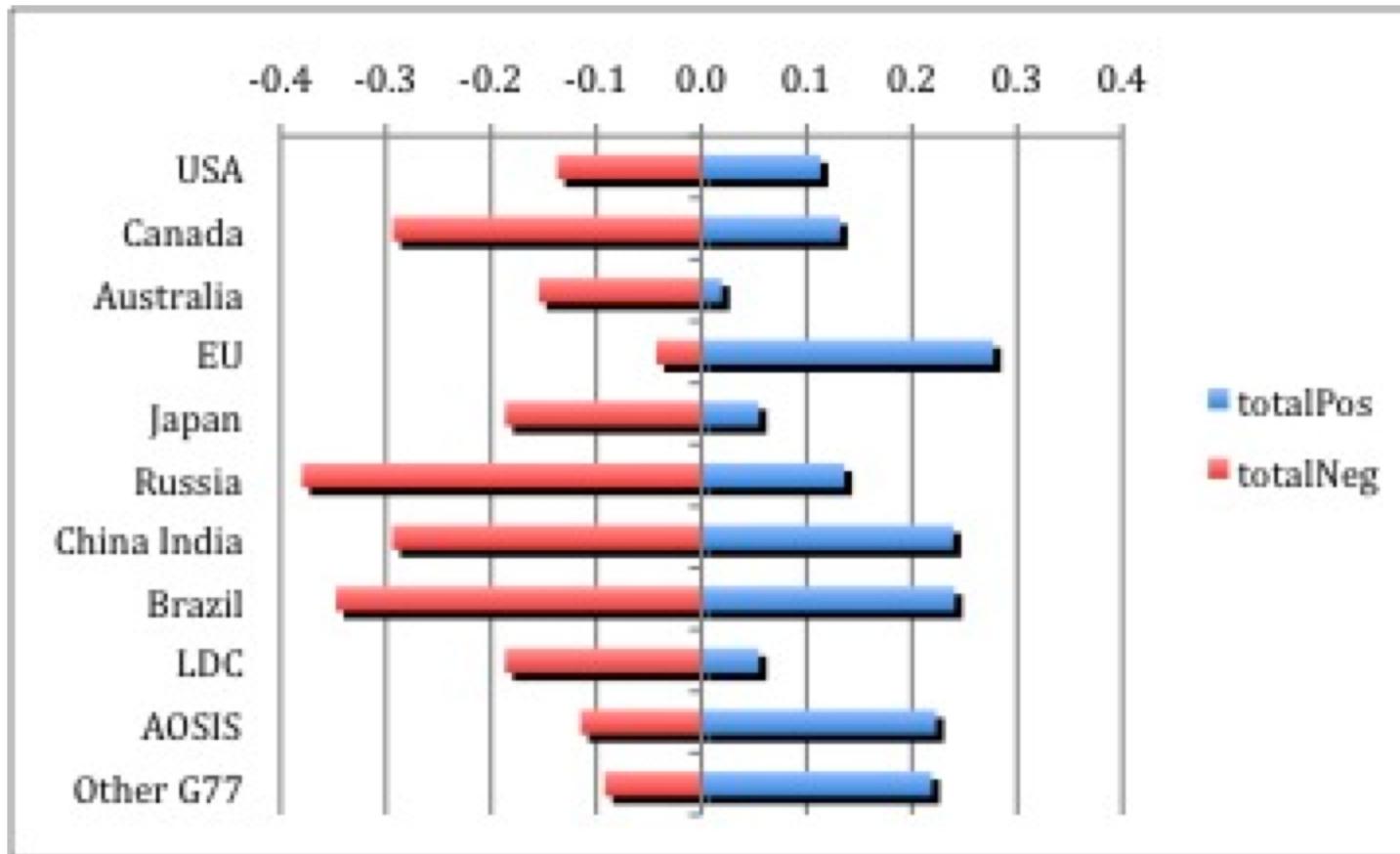


Figure 1. Positive and Negative Externalities of Party Groups.

## COP Paris 2015 Outcome Predictions

**Table 1.** Ex Ante predictions and Ex Post assessments.

Issue	Ex Ante Predictions				Ex Post Assessment
	Average of Ex Ante Experts (range; s.d.)	Inclusive Exchange Model	Restrictive Exchange Model	Predictioneer's Game	Our Coding of COP-21 Texts
Differentiation	39 (0-75; 23.03)	38	35	58	50
Mitigation—MRV & Compliance	43 (0-75; 27.54)	44	58	50	70
Mitigation—Legal Form	60 (0-70; 19.42)	45	51	53	70
Adaptation—Legal Framework	44 (0-100; 18.76)	79	79	60	50
Adaptation—Institutions	52 (0-60; 20.55)	65	65	67	50
Climate Finance—Volume	17 (0-100; 17.10)	60	41	55	20
Climate Finance—Who Pays?	33 (0-80; 20.49)	39	21	27	20
Adaptation Reserved Finance	30 (0-100; 27.54)	53	68	66	40
Loss & Damage	29 (0-70; 16.63)	10	15	45	30
Ambition Level—Mitigation Mechanism	42 (0-100; 21.68)	30	43	35	65
Mitigation—2050	29 (0-100; 25.39)	69	58	47	10
Mitigation—2100	33 (0-100; 35.10)	91	86	85	80
Ex Ante Assessment of Future (I)NDCs	42 (0-100; 29.15)	7	9	47	20

Note: The Ex Ante Expert survey contains responses from 38 experts, each of whom predicted the outcomes on almost all of the 13 issues.

# COP Paris 2015 mean errors

**Table 2.** Mean errors of each of the predictions (13 issues).

	<b>Our Coding of COP-21 Texts</b>
Average of Ex Ante Experts	14.92 (12.77)
Individual Ex Ante Experts	20.75 (10.79)
Inclusive Exchange Model	24.38 (13.87)
Restrictive Exchange Model	18.62 (11.86)
Predictioneer's Game	19.54 (10.71)

Note: Standard deviations in brackets.

<http://stokman.org/artikel/16%20Sprinz%20et%20al%20Politics&Governance.pdf>

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# Analysis COPs Copenhagen-Paris

- Copenhagen 2009 COP15
  - Blockade by two central issues: Kyoto Treaty and MRV by particularly China and India
  - Enforcement (power) dominant
- Paris December 2015 COP21
  - Carefully prepared with 5 COP's between COP15 and COP21
  - Persuasion dominant thanks to new studies on climate change, supported by almost all climatologists
  - Joint production dominant thanks to concrete ambitious goals 2050 and 2100
  - Joint production in implementation crucial as Enforcement is limited ('should comply' instead of 'shall comply')

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Next

- Jelmer Draaijer: software for equal gain and random exchange rates models
- Lars Padmos: process of collecting data
- Exercise: compare equal gain with random rates on one of the datasets (potential coalitions; one of the Paris restricted subsets)

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