

Tutorial ASONAM 2018

Collective Decision Making: Processes and models

An Introduction

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Collective decision Making

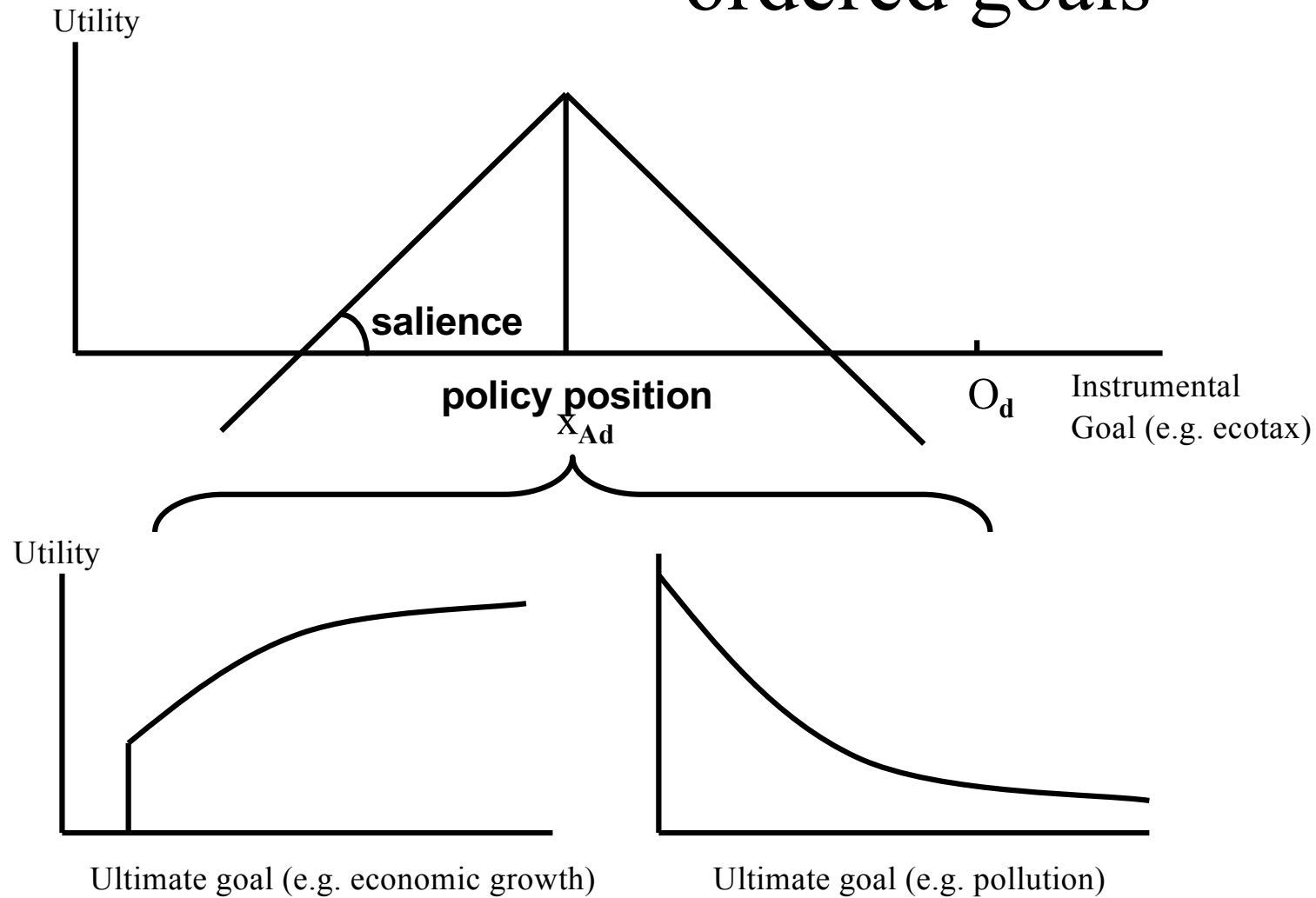
- **Two stages** (Mokken and Stokman 1976; Stokman and Van den Bos 1992):
 - first stage: influence aimed at building a *sufficiently large* coalition close to own *policy position*
 - second stage: voting based on *voting positions*, partly adapted during influence stage
- **Influence** in first phase 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>Fundamental Processes</i>	<i>Dominant Networks</i>	<i>Integrated Approach</i>	<i>Conditions for process to dominate</i>
<i>Persuasion</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>Logrolling</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>Enforcement</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:

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

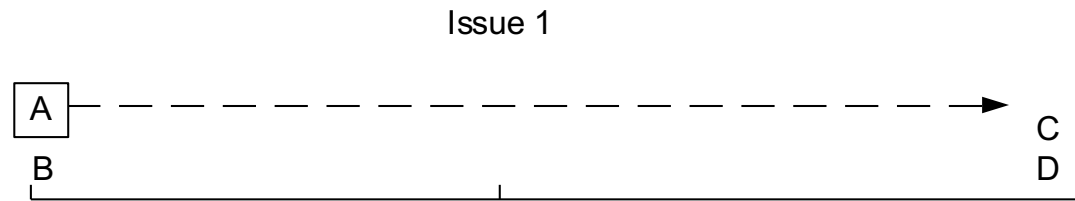
Christopher H. Achen, Institutional realism and bargaining models. In Robert Thomson et al. The European Union Decides, Cambridge: Cambridge University Press 2006, Pp. 86-123

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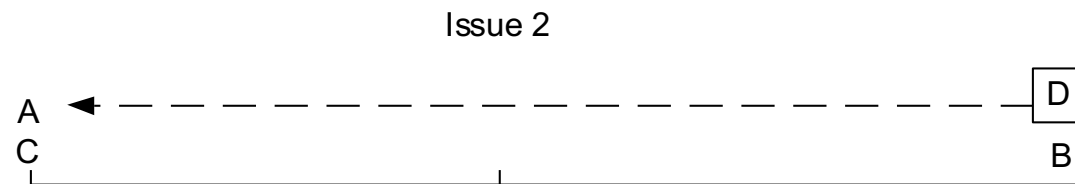


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Exchanging Voting Positions



O1 (NBS as expected outcome)



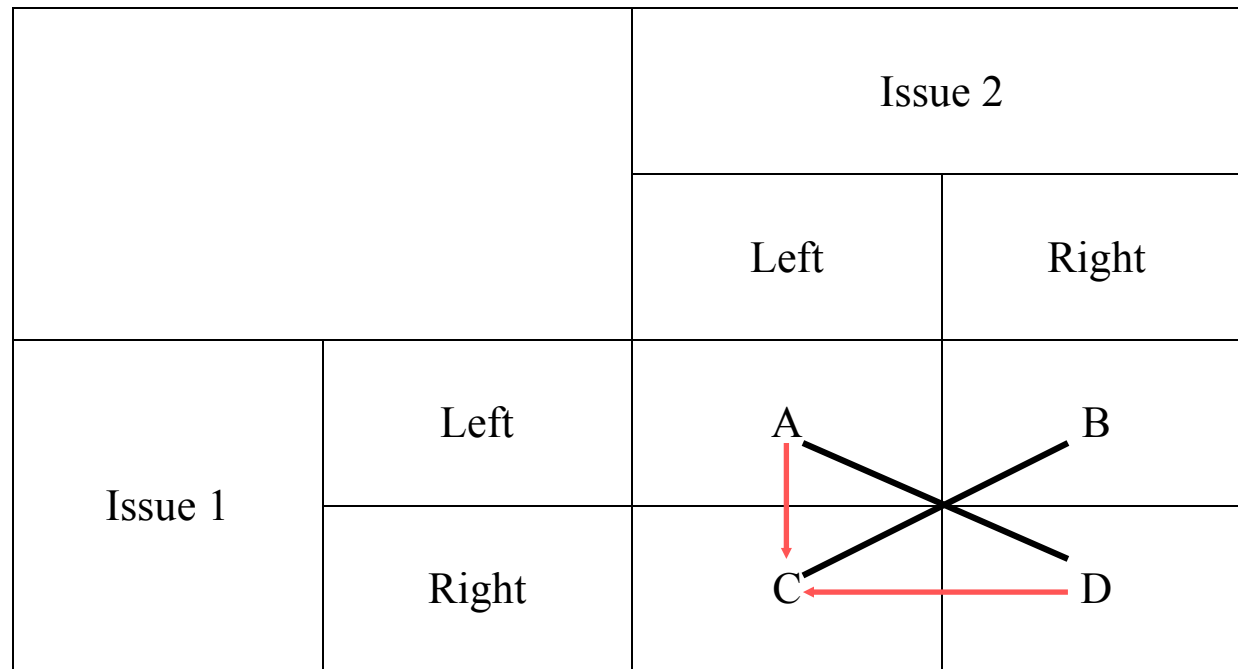
O2

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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

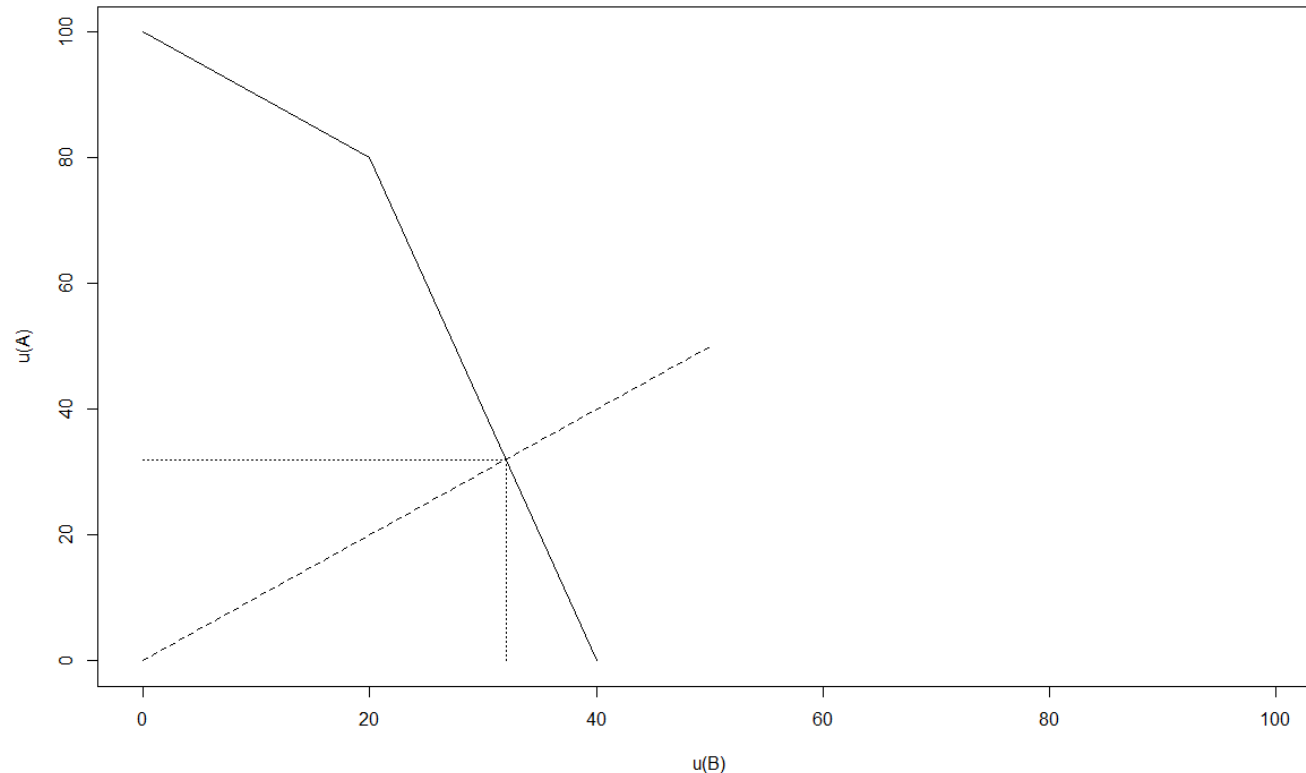
[The Exchange of Voting Positions: An Object-Oriented Model of Policy Networks](#), Bruce Bueno de Mesquita and Frans N. Stokman (eds), *European Community Decision Making: Models, Applications, and Comparisons*, New Haven: Yale University Press, 105-127

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Random variation of gains: example (1)



Pareto frontier (PF) of *utilities*

Upper portion: B shifts all the way to A

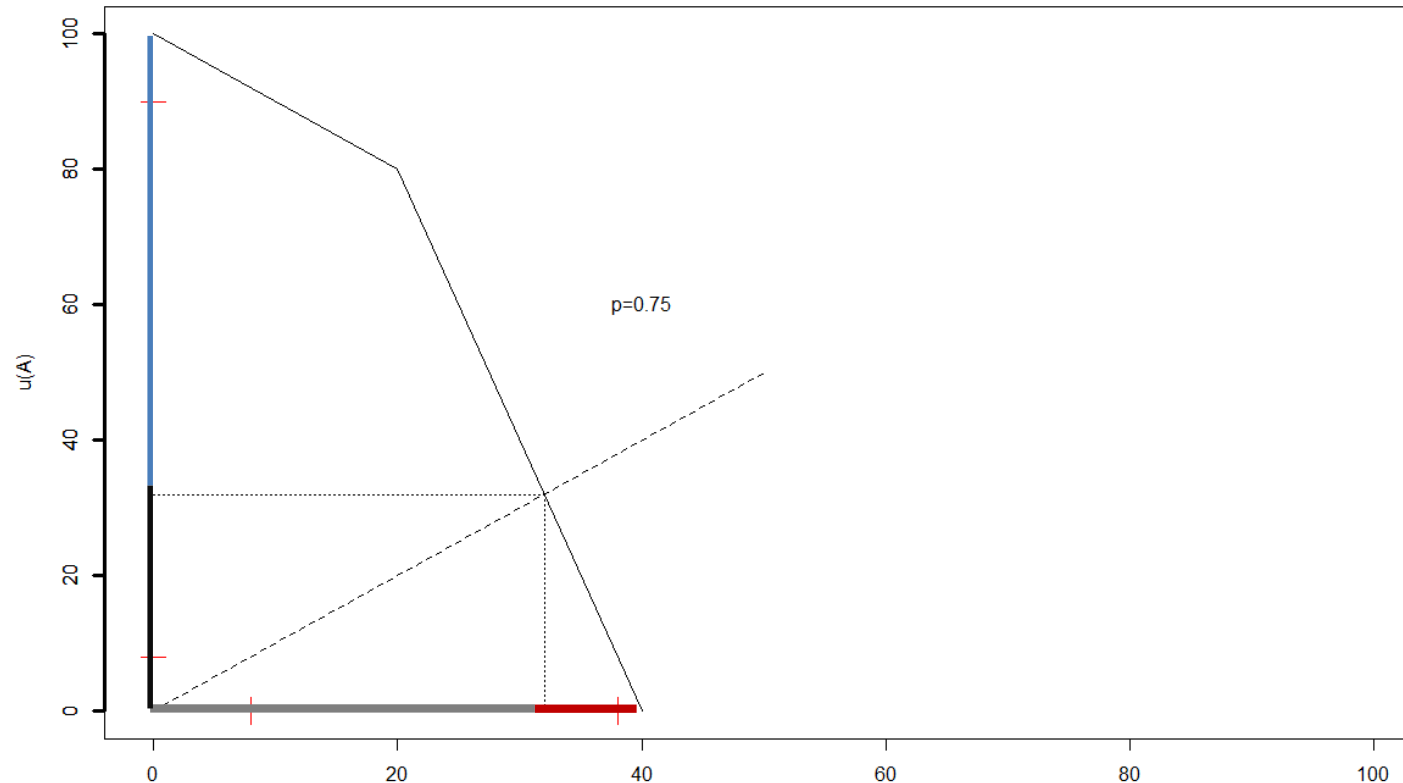
Lower portion: A shifts all the way to B

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)

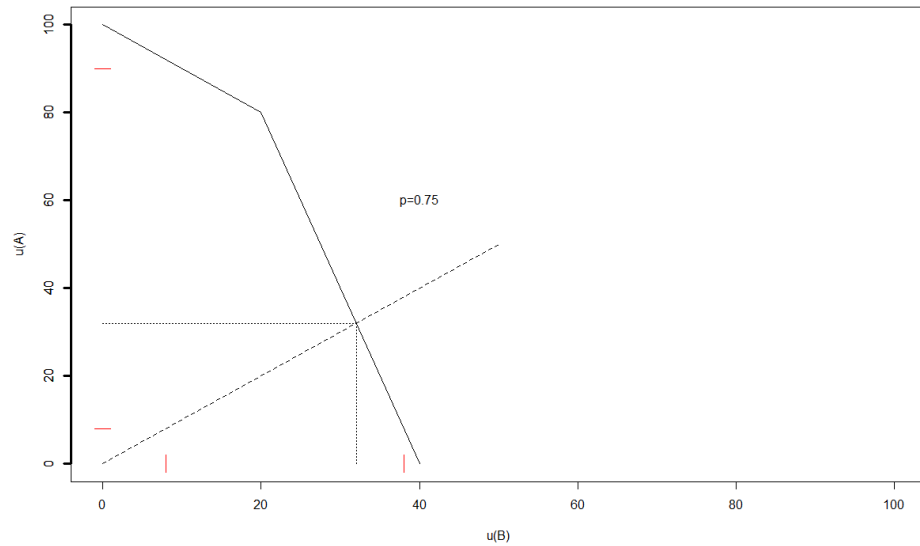
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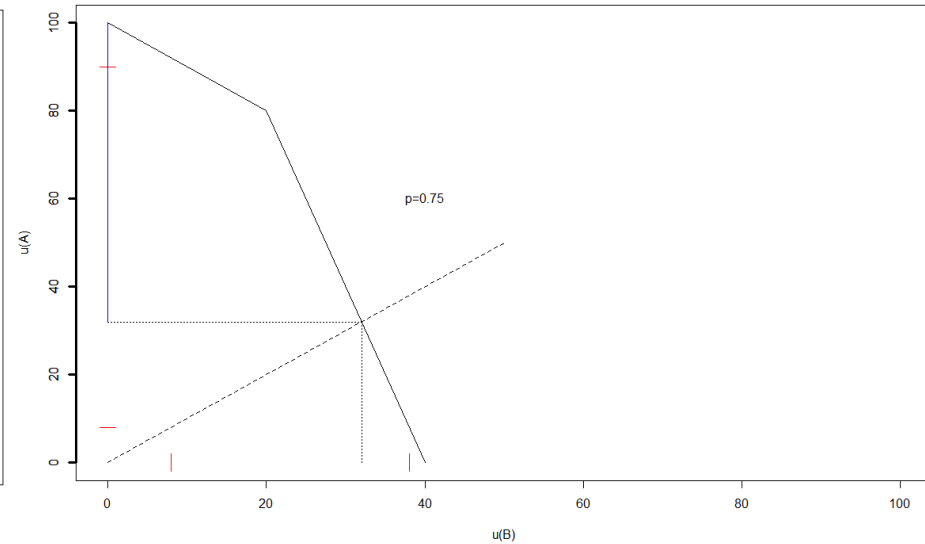
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Choice of p determines width of interval

Random variation of gains: example (3)



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



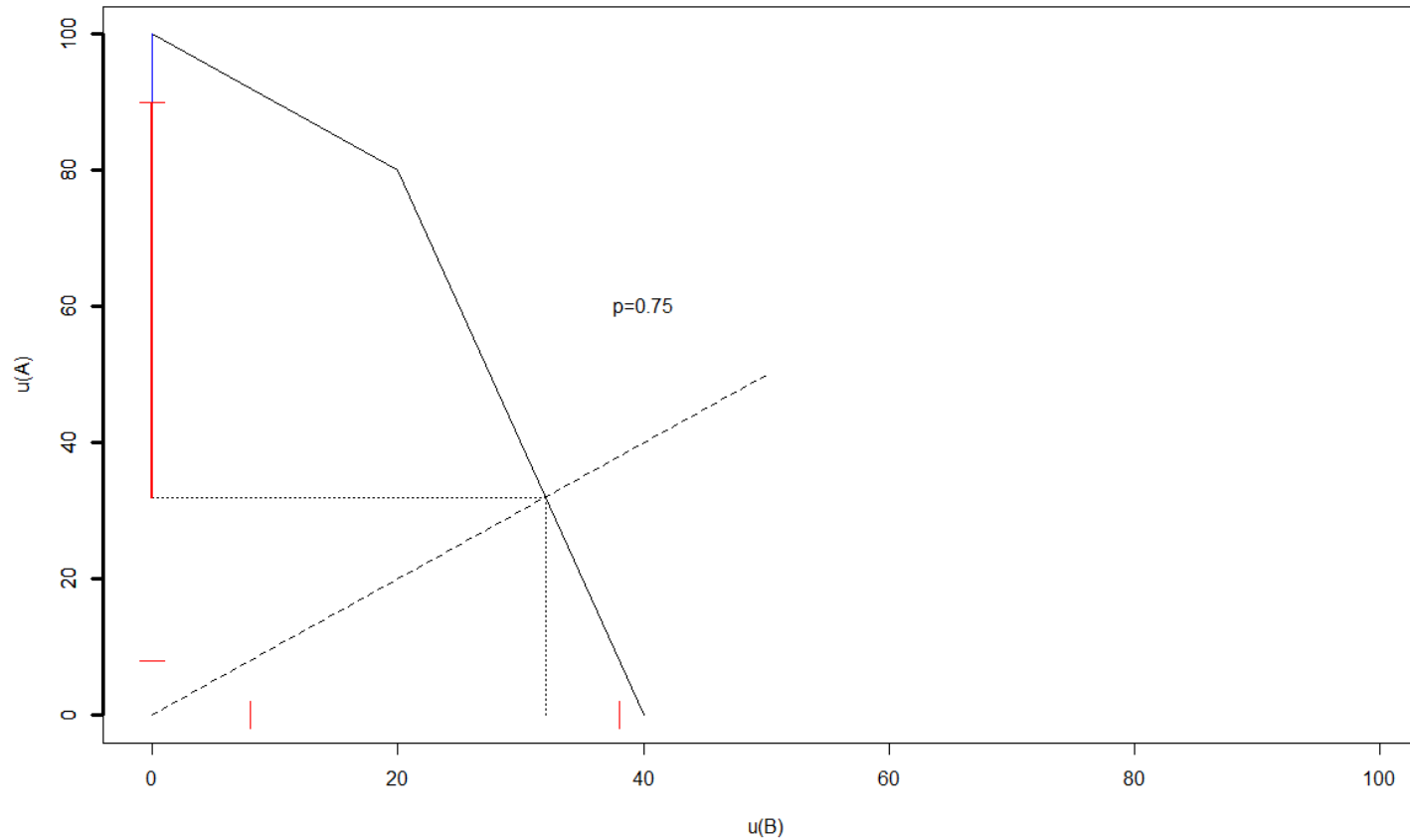
Actor A is randomly selected to win
(blue line segment, *above* EG)

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Random variation of gains: example (4)



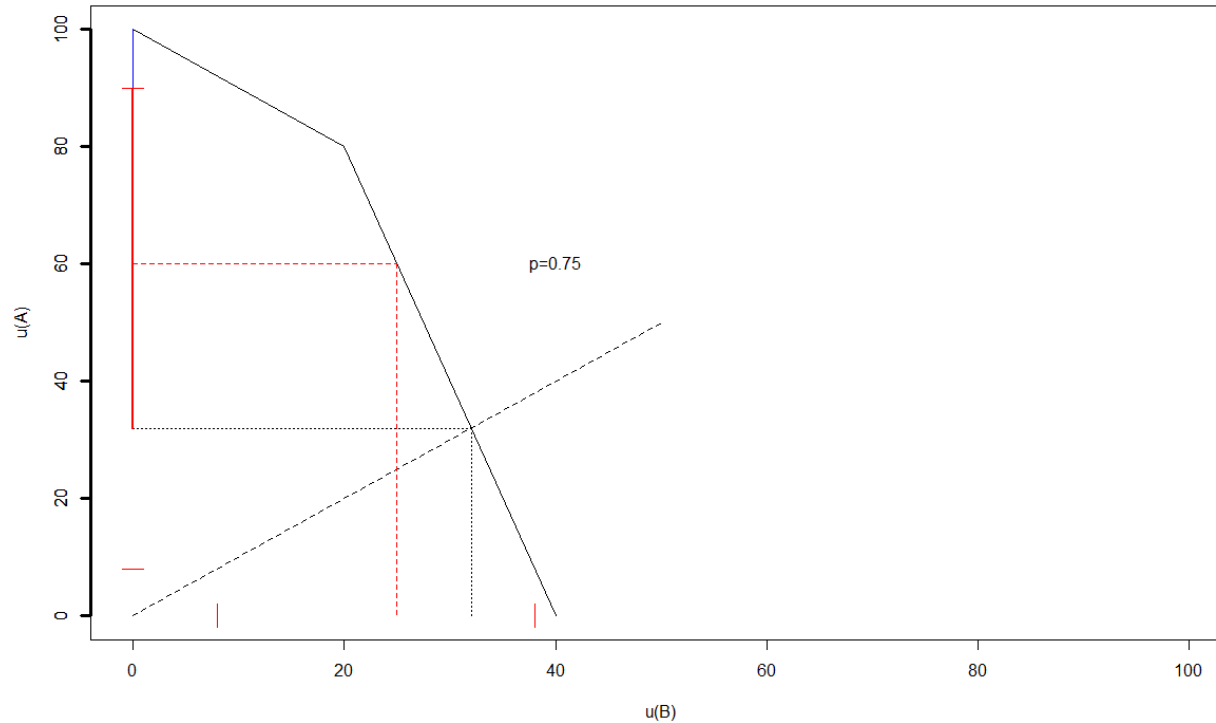
Utility interval for A shown by red line segment
(bounded above by p)

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Random variation of gains: example (5)



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

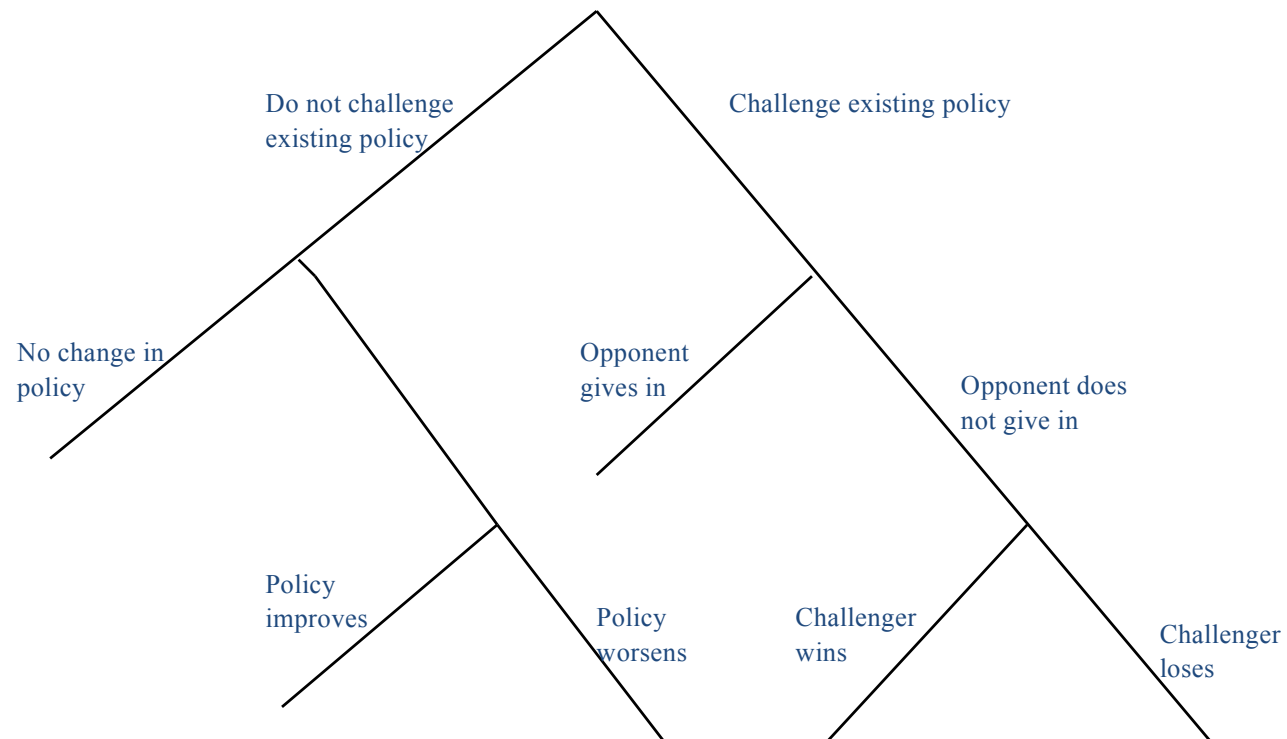
Jacob Dijkstra, Marcel Van Assen, Frans Stokman and Jelmer Draaijer
Random Variation of Exchange Rates in the Equal Utility Exchange Model
(Internal paper 2018)

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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 Saliency for outcome close to own position for all COP Party Groups on all issues
 - Relative influence and saliency 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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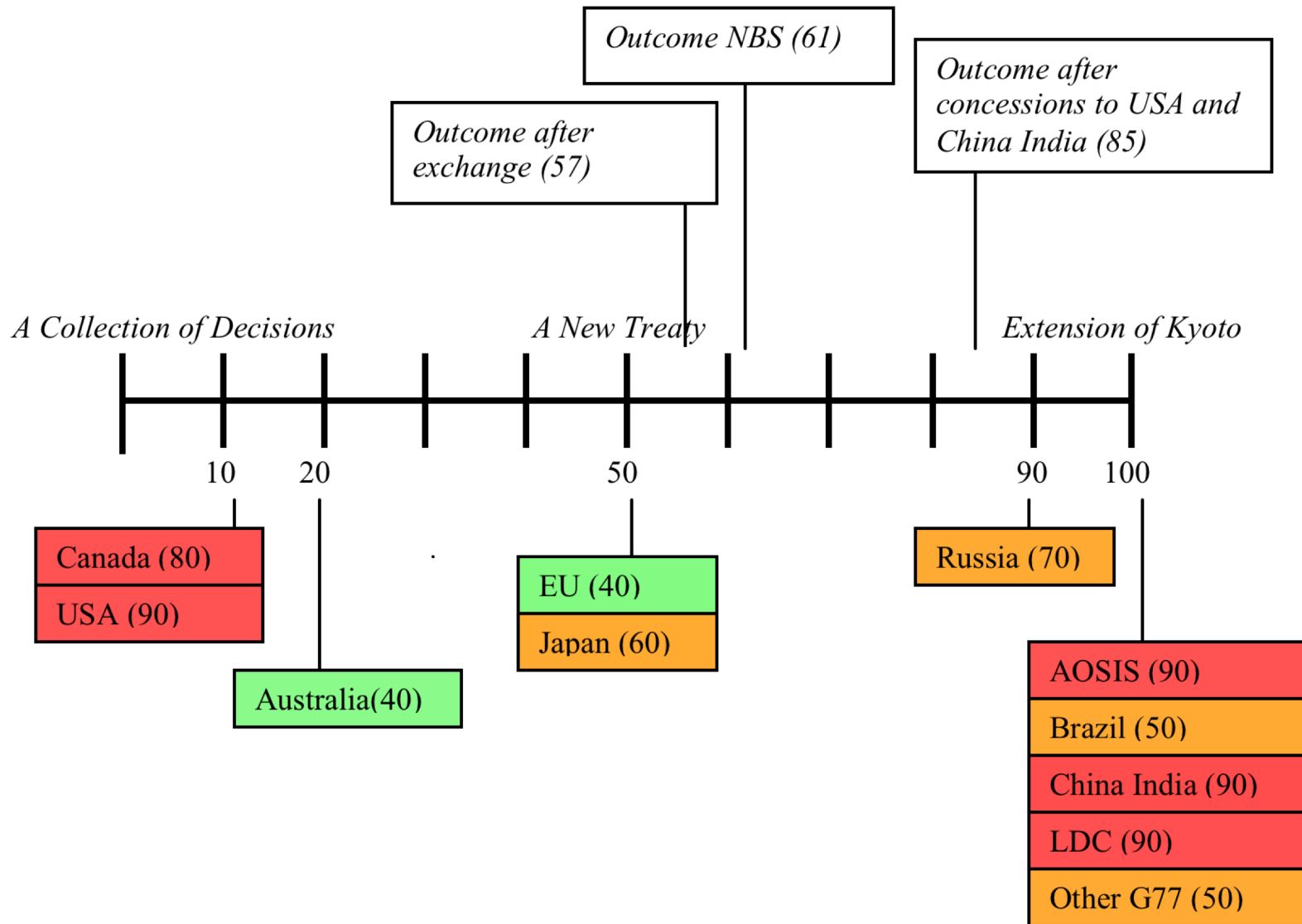
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Table 1: Party Groups with Their Relative Influence and the Importance They Attach to Reaching an Overall Agreement.

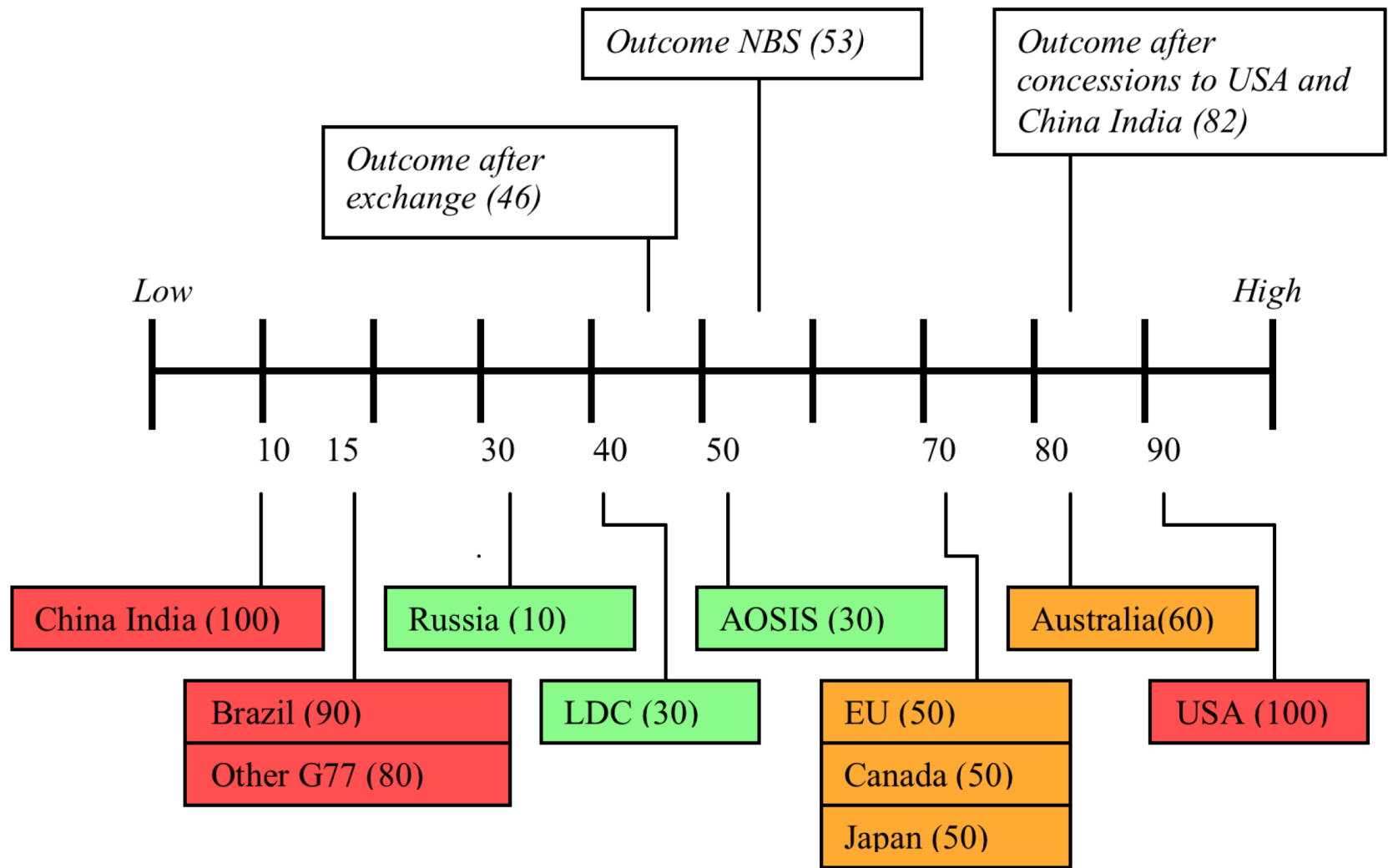
<i>Party Groups</i>	<i>Abbreviation</i>	<i>Relative Influence</i>	<i>Importance Attached to Reaching Agreement</i>
United States of America	<i>USA</i>	100	10
Canada	<i>Canada</i>	15	40
Australia	<i>Australia</i>	10	50
European Union	<i>EU</i>	60	90
Japan	<i>Japan</i>	20	60
Russia	<i>Russia</i>	5	10
China 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 ₂ Reduction by Rich Countries in 2020 (0 = Low, 100 = High)	56 (Russia position)	68
Domestic CO ₂ Emission Reduction (0 = Low, 100 = High)	30 (Australia, Canada position)	74
MRV CO ₂ 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 ₂ Reduction by Rich Countries in 2020 <i>(0 = Low, 100 = High)</i>	70 (EU and Brazil position)	84
Domestic CO ₂ Emission Reduction <i>(0 = Low, 100 = High)</i>	32 (Australia, Canada position)	89
MRV CO ₂ 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

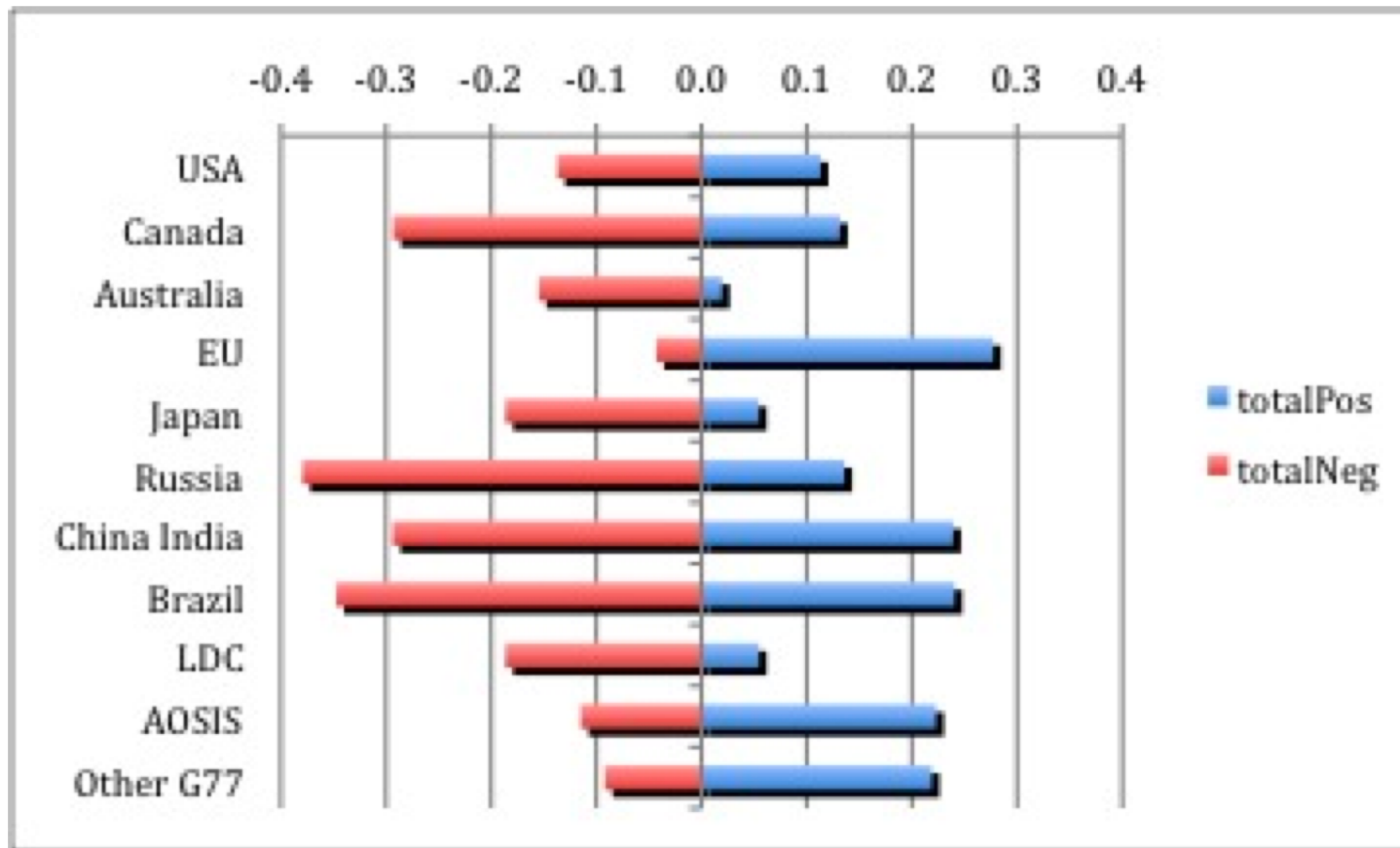


Figure 1. Positive and Negative Externalities of Party Groups.

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COP Paris 2015 Outcome Predictions

Table 1. Ex Ante predictions and Ex Post assessments.

Issue	Ex Ante Predictions			Predictioneer's Game	Ex Post Assessment
	Average of Ex Ante Experts (range; s.d.)	Inclusive Exchange Model	Restrictive Exchange Model		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).

	Our Coding of COP-21 Texts
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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