Public Goods, Equity Considerations, and Climate Change

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Behavioral Models and Some Empirical Evidence

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Overview of Lecture

This morning:

- Some ideas on behavioral economics
- From individual decisions to countries' positions
- Potential roles of equity considerations
- Equity and fairness in international negotiations

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. . . and for this afternoon:

- Experiments and environmental economics
- Experimental evidence on coalition formation

Behavioral Economics I

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"Ceteris paribus, the more realistic our assumptions about economic actors, the better our economics" (Rabin 2002)

Behavioral Economics II

Behavioral Economics targets to

- Increase explanatory power of economics
- Provide and accept more realistic psychological foundations
- Increase realism of models, thereby generating theoretical insights, making better predictions, and suggesting better policy
- Change some underlying assumptions but not completely reject neoclassical approach

Behavioral Economics III

Recipe for Behavioral Economics

- Identify generally accepted/used assumptions or models
- Identify anomalies
- Rule out alternative explanations
- Based on anomalies, create new theories which are able to explain the observed behavior
- Construct new models to arrive at new testable predictions
- Discriminate between different alternative theories

Behavioral Economics and the Environment

- Decisions under uncertainty
- Status quo bias and reference-dependence
- Intertemporal decision-making
- Social preferences
- Crowding out and in of intrinsic motivation

A Standard Paradigm

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Payoff maximization?

A Standard Paradigm

Payoff maximization?

Experimental evidence

- Giving in dictator games
- Rejections in ultimatum games
- Voluntary giving in (some) public good games
- Punishment of free-riders

$\Rightarrow$ Not just payoff-maximizers

Not Just Payoffs

"...how selfish soever a man may be supposed to be, there are evidently some principles in his nature, which interest him in the fate of others, and render their happiness necessary to him, though he derive nothing from it, except the pleasure of seeing it."

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(Adam Smith, The Theory of Moral Sentiments 1759)

Behavioral Alternatives

Theories have incorporated

- Inequality aversion and fairness
- Joy of giving (warm-glow)
- Spite and envy
- Reciprocity and intentions

(How) do these apply to international agreements?

The Effects of Inequality Aversion

$$u_i = \pi_i$$

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- Bolton and Ockenfels (2000): Compare to average: $\pi_i / \sum_j \pi_j$ vs. $1/n$
- Fehr and Schmidt (1999): Compare to each individual: $\pi_i - \pi_j$
- Deviation from "fair" share reduces utility
- Models can explain decisions in dictator, ultimatum games

Inequality Aversion and Prisoners' Dilemma

$$u_i = \pi_i - \alpha_i \frac{1}{N-1} \sum_{j \neq i} \max[\pi_j - \pi_i, 0] - \beta_i \frac{1}{N-1} \sum_{j \neq i} \max[\pi_i - pi_j, 0]$$

$$(\alpha_i \geq \beta_i, \beta_i \leq 1)$$

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Prisoners' dilemma

- $B(k+1) - C(k+1) \leq B(k)$ and
  $B(k+1) - C(k+1) \geq B(k) - C(k)$

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Prisoners' dilemma

- $B(k+1) - C(k+1) \leq B(k)$ and $B(k+1) - C(k+1) \geq B(k) - C(k)$
- Cooperation in prisoners dilemma (symmetry assumption) if sufficiently inequality averse
- Non-cooperation *always* an equilibrium!
- Similar, in general, no improvement in public good game

Environmental and Public Goods

Voluntary Provision of Public Goods

- Free-riding incentives
- Cooperation among individuals?
- Formation of institutions to overcome free-riding?

International Environmental Problems

- Free-riding incentives
- Cooperation among countries?
- Coalition formation?

The Basic Coalition Formation

$$\pi_i = -q_i^2 + \alpha \sum_j q_j$$

The standard coalition formation game

- Stage 1: Decision to enter the coalition S
- Stage 2: Coalition choose abatement collectively, non-signatories choose independently
- Equilibrium
  - Stage 2: coalition internalizes benefits of its members

  $\Rightarrow$ $q_i = k\alpha/2$ $(k = \#S)$ if $i \in S$, and $q_i = \alpha/2$ if $i \notin S$
  - Stage 1: Well-known result: only $k = 3$ players form a coalition
  - Concept of internal and external stability

Inequality and Coalition Formation

If (all) agents are sufficiently inequality-averse, even the grand coalition can be stable.

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Problem 1: asymmetries in inequality aversion

- In inequality aversion: If a few countries are payoff maximizers, cooperation can be destroyed
- The more players in the coalition are inequality averse, the larger the incentives of others to join

$\Rightarrow$ Potential interpretation as conditional cooperators

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Problem 2: asymmetries in payoffs (costs, benefits)

- Ambiguous effects of inequality aversion
- Inequality aversion may hurt cooperation

Equity in Climate Talks – Social Preferences?

Equity arguments play vital role in international negotiations

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Equity arguments play vital role in international negotiations

- Developing countries: "economic and social development must not be hampered in order to tackle a problem caused mainly by industrialized countries."
- Climate Action Network (environmental interest group): "... every country has a duty to ensure its emissions do not exceed its global per capita share"
- UN Convention Climate Change: "on the basis of equity and in accordance with their common but differentiated responsibilities"

Different Equity Principles

Inequality concerns and equity arguments in climate negotiations:

- Egalitarian rule: Equal per capita emissions
- Sovereignty rule: Equal percentage reduction
- Polluter-pays rule: Equal ratio abatement costs and emissions
- Ability-to-pay rule: Equal ratio between abatement costs and GDP

Different Equity Principles

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"notions of fairness can provide a basis of an international regime only if there is a certain minimum of consensus among its members about what is fair and unfair"
(Ringius et al. 2002)

When Different Equity Criteria are Available...

Example: sharing \$20 initial endowment (\$5,\$5) vs. (\$10,\$0)

When Different Equity Criteria are Available...

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- Usually multiple equity criteria available
- Bargaining influenced by fairness considerations
- Claims of "fair share" when feeling disadvantaged
- Economic and psychological literature indicates self-serving bias in judgments of fairness (Babcock et al. 1995, Hennig-Schmidt 2002)
- Statements of fairness legitimate "the pursuit of self-interest with minimal condemnation or other costs" (Albin 2001)
- (Flexible) use of equity arguments might depend on individual position

Self-Interested Use of Equity

"We talk on principle but we act on interest."

(William Savage Landor 1775-1864)

Self-Interested Use of Equity

"We talk on principle but we act on interest."

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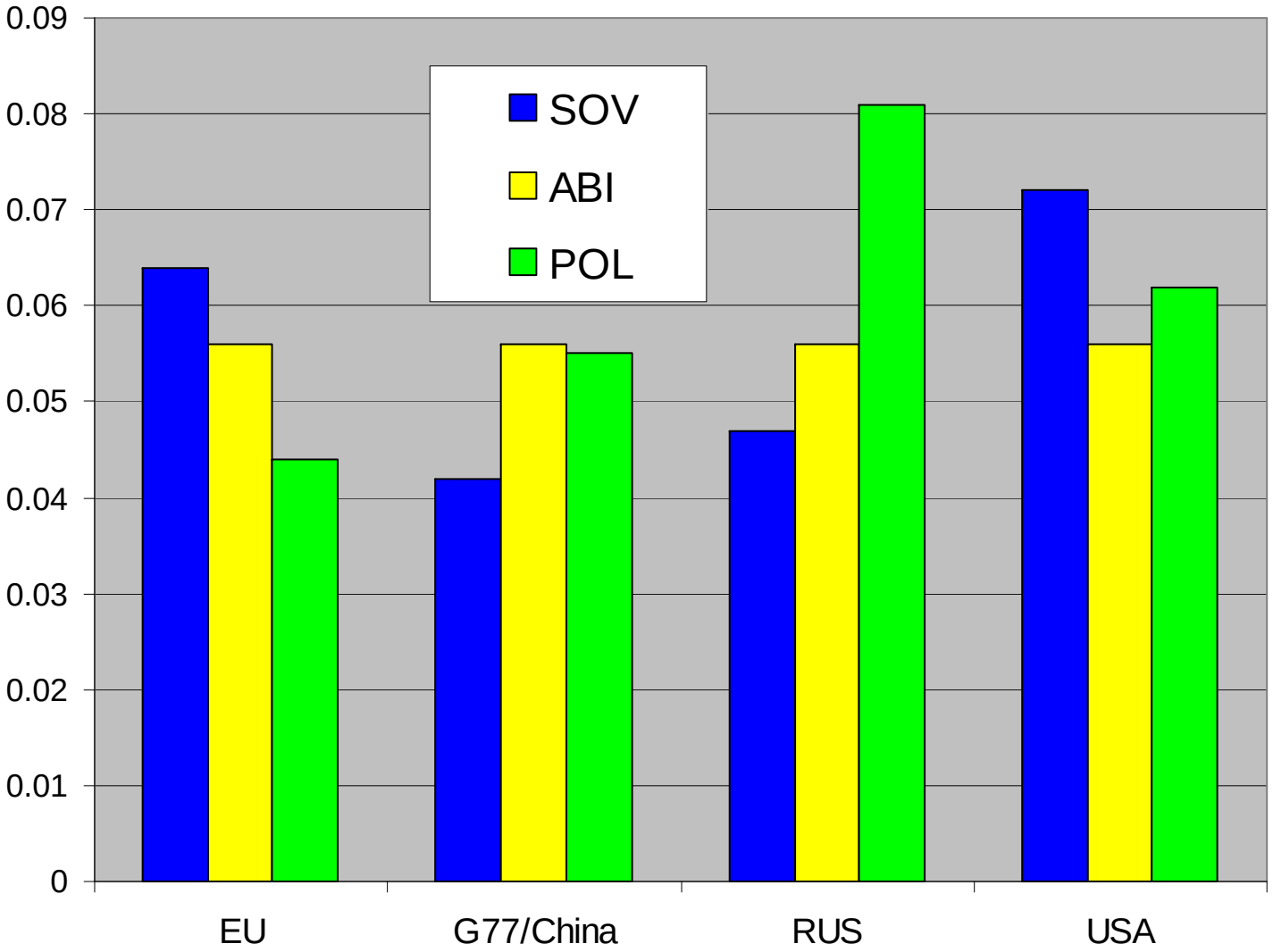
- Hypothesis: Use of equity criteria in international negotiations is driven by the implied relative costs
- Questions:
  - Pursuing self-interest with minimal condemnation of others?
  - Is the self-interested use of equity seen by observers
  - Is there a self-interested bias: I see the position of my own country as fair and less self-interested?
  - Does my own view on equity influence the perception of countries positions?

The Economic Costs of Equity

- Assumptions
  - Exogenous total emissions target
  - Emissions trading, equalized MACs (partial model)
  - Efficiency and burden sharing can be separated
  - Calculate allowance allocation, total costs, per capita costs for different abatement goals (permit prices $40-200 per ton C)
- Data
  - Marginal abatement costs for 2020 from POLES model (Criqui 2001)
  - Projections for GDP, emissions, populations for 2020 based on DOE (2005), historical emissions from WRI (2005)
  - Countries/Regions: EU, G77/China, USA, Russia

Ranking Equity Criteria Costs in % of GDP



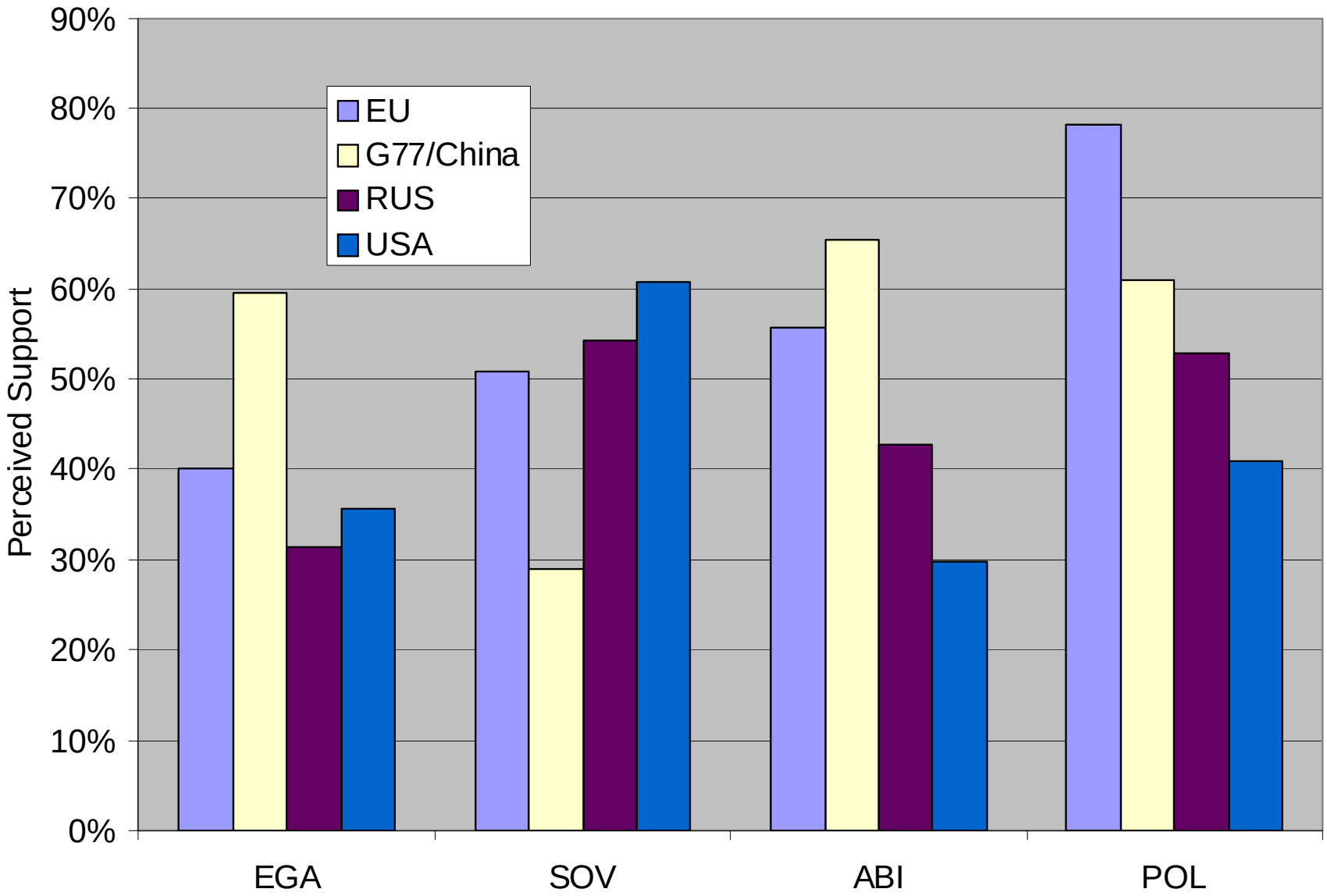
Short Description of the Survey

- World-wide survey with about 1500 people involved in climate policy
- Addresses: official participants lists of conferences and workshops dealing with aspects of climate change (UNFCCC, IPCC)
- Via email, webpage with individual login
- Participation: 230 participants
- Main purposes:
  - Identifying personal views on equity
  - Identifying views on negotiation positions of major country groups

Short Description of the Survey

- Part A: Description of survey and equity criteria
- Part B: Personal views on equity
- Part C: Assessing the position of countries
  - To which degree should the respective equity rule be reflected in the distribution of entitlements for greenhouse gas emissions within 20 years? (very high/high/moderate/low/no degree, dont know)
  - Which rule is the most important for the respective country?
  - Does the respective reason play an important role? (material self interest, fairness considerations of public, facilitation of climate negotiations, pressure from industry, pressure from environmental NGOs)
- Part D: Personal information
  - Gender, age, nationality, country of residence, professional position, type of organization, field of highest degree, participation in COP or SUBSTA meetings/role of participation

Support for Equity Criteria by Countries



Differences in Support

Explanatory variables	(1) Expected position of the EU	(2) Expected position of G77/China
Assessment EGA	– (–)	1.05** (2.50)
Assessment SOV	1.28*** (2.95)	– (–)
Assessment POL	1.49*** (3.16)	0.44 (1.08)
Assessment ABI	0.80* (1.85)	1.26*** (2.97)
Personal consistency equity rules	0.78*** (4.61)	0.81*** (5.00)
Equity importance	0.10 (0.55)	−0.04 (−0.23)
COP negotiator	0.07 (0.33)	−0.39** (−2.06)
NGO	−0.07 (−0.23)	0.49 (1.59)
Social science	−0.12 (−0.56)	0.15 (0.75)
Age	−0.18 (−0.50)	0.42 (1.32)
Gender	−0.00 (−0.01)	0.53*** (2.89)
*EU*assessment EGA*	0.22 (0.56)	−0.40 (−1.06)
*EU*assessment SOV*	−0.44 (−1.20)	−0.60 (−1.56)
*EU*assessment POL*	0.08 (0.20)	0.13 (0.36)
*EU*assessment ABI*	0.22 (0.59)	−0.30 (−0.80)
*G77/China*assessment EGA*	−0.09 (−0.21)	−0.68* (−1.66)
*G77/China*assessment SOV*	−1.21*** (−2.82)	−0.23 (−0.57)
*G77/China*assessment POL*	−0.51 (−1.05)	−0.12 (−0.31)
*G77/China*assessment ABI*	−0.25 (−0.60)	−0.83** (−1.99)
GDP per capita	−0.32*** (−2.69)	−0.05 (−0.46)
Constant	0.38 (0.27)	−2.08 (−1.61)

Differences in Support

Explanatory variables	(3) Expected position of Russia	(4) Expected position of the USA
Assessment EGA	– (–)	−0.54 (−1.20)
Assessment SOV	1.77*** (3.67)	0.92** (2.25)
Assessment POL	0.83* (1.74)	0.63 (1.52)
Assessment ABI	1.38*** (2.91)	– (–)
Personal consistency equity rules	0.46*** (2.91)	0.15 (0.98)
Equity importance	0.30* (1.80)	0.30* (1.68)
COP negotiator	−0.08 (−0.42)	0.38* (1.89)
NGO	−0.14 (−0.51)	−0.09 (−0.28)
Social science	−0.08 (−0.43)	−0.23 (−1.09)
Age	−0.27 (−0.83)	−0.01 (−0.04)
Gender	0.31* (1.75)	−0.03 (−0.17)
*EU*assessment EGA*	0.39 (0.91)	0.57 (1.37)
*EU*assessment SOV*	−0.36 (−1.01)	0.05 (0.14)
*EU*assessment POL*	−0.31 (−0.84)	−0.50 (−1.38)
*EU*assessment ABI*	−0.05 (−0.13)	−0.49 (−1.23)
*G77/China*assessment EGA*	0.07 (0.15)	0.46 (1.04)
*G77/China*assessment SOV*	−1.60*** (−3.73)	−0.57 (−1.39)
*G77/China*assessment POL*	−0.49 (−1.16)	−0.66 (−1.59)
*G77/China*assessment ABI*	−1.11*** (−2.69)	−0.25 (−0.62)
GDP per capita	−0.41*** (−3.76)	−0.28** (−2.51)
Constant	0.44 (0.34)	−0.20 (−0.15)

Heterogeneity of Equity Views

Result 1:

The importance of incorporating the specific equity rules in international climate negotiations is perceived to strongly differ between regions.

Result 2:

The views on how important the incorporation of the specific equity rules are for the respective regions depend on personal characteristics such as personal equity views and the economic performance of the agents country.

Costs Determines Equity Views

Result 3:

Consistent with a self-interested use of equity criteria, the economic costs of equity rules explain their perceived support by the EU, Russia, and the USA. A link between the perceived position of G77/China and the underlying costs cannot be established.

Reasons for Supporting Equity Criteria I

	EU	G77/China	Russia	USA
Material self interest	63% EU 52% G77 71%	**86%** EU 97% G77 75%	**89%** EU 94% G77 82%	**93%** EU 97% G77 91%
Fairness considerations of the public	**88%**	59%	41%	44%
Facilitation of climate negotiations	**83%**	47%	49%	31%
Pressure from industry	53%	45%	**70%**	**84%**
Pressure from environmental NGO's	**79%**	31%	30%	47%

Result 4:

The regions are perceived to strongly differ in the reasons which determine their positions on the incorporation of the most important equity rule, with G77/China, Russia, and the USA being seen as using this equity principle out of material self-interest.

Reasons for Supporting Equity Criteria I

Explanatory variables	Material self-interest	Fairness consi-dera-tions	Facilita-tion of negotia-tions	Pressure from industry	Pressure from envi-ron-mental NGO's
Assessment EU	-- (--)	1.61*** (5.76)	2.03*** (6.78)	0.08 (0.32)	2.55*** (6.41)
Assessment G77/China	1.32*** (4.58)	0.13 (0.50)	0.39 (1.41)	-- (--)	-0.08 (-0.21)
Assessment Russia	0.71*** (2.66)	-- (--)	0.76*** (3.10)	0.13 (-0.47)	-- (--)
Assessment USA	1.15*** (3.89)	0.05 (0.22)	-- (--)	1.07*** (3.59)	1.26*** (3.97)
EGA most important	0.23 (0.67)	0.55** (2.00)	-0.18 (-0.64)	0.13 (0.48)	0.73* (1.92)
SOV most important	0.58* (1.71)	-0.21 (-0.75)	-0.10 (-0.36)	0.93*** (3.07)	-0.02 (-0.06)
POL most important	-0.60** (-2.26)	0.31 (1.16)	0.25 (0.90)	-0.31 (-1.17)	0.95** (2.52)

Result 5:

Polluter-pays principle is less seen as being used out material self-interest. The sovereignty rule is associated with pressure from industry.

Reasons for Supporting Equity Criteria II

Result 6:

Differences in expected reasons for why different regions take specific equity positions are consistent with different versions of self-interested biases:

Agents are more (less) likely to state that reasons with positive (negative) attributes important

- if they assess a country or group of countries which supports the equity rule they prefer themselves
- if they assess their own region

Negotiators see the negotiating position of regions as less driven by industry.

Conclusions from this Study

- Equity notions are relevant in international negotiations
- Use of equity appears to be correlated costs
- Indirect evidence for interaction bargaining power and use of favorable equity-criteria
- Perceived position of countries
  - Support of equity criteria differs across countries
  - Use of equity largely consistent with self-interest
- Self-interest seen by observers, less so for EU which is seen as facilitator and fairness-driven
- Perceptions consistent with self-interested bias
  - Use of equity by own country
  - If use of equity by a country reflects own preference of equity norms

Some Take Away Points

- Worthwhile to get inspired by behavioral economic ideas
- Equity, (social) comparison may matter not only in individual decisions
- Hidden self-interest?
- How to build models that incorporate different equity criteria (dimensions for comparison with others)
- What is the impact on coalition formation?