

Climate Policy Commitment Devices

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Motivation

- Future planners may backtrack on past agreements:
- The Guardian, Feb 1, 2016:

Rubio and Cruz have both said they would pull the US out of the historic Paris climate accords, and with Bush and New Jersey governor Chris Christie said they oppose any measures that would “destroy” the economy or stifle business. Donald Trump, Bush and John Kasich have mocked the Paris summit as an unnecessary diversion.

Motivation: Fossil Fuel Conservation and Climate Change

The problem

- Need to keep some fossil fuels in deposits to prevent climate catastrophe (threshold)
- But how much? (uncertainty)
- If we=2016 save FFs, they still may be exhausted by 2100 (FF conservation is strategic substitutes).

Possible institutional solutions

- Cheap clean energy could make FF redundant
- Certain (worst-case) climate damages

Possible ethical solutions

- Eco-dictator
- 'Rawls'

Sequential Public Good Threshold Game with Uncertainty

4 periods: $t=\{1,2,3,4\}$

$t=1$:

- Start with 2 resource units: $S_1=2$
- Exploit, or not: $R_1=0$ or $R_1=1$

$t=2,3$

- Start with S_t resource units: $S_t=S_{t-1}-R_{t-1}$
- Exploit (possible if resource left), or not: $R_t=0$ or $R_t=1$

$t=4$:

- stable climate if 2 resource units conserved: $C=1$ if $S_4=2$
- catastrophe if 0 resources left (full extraction): $C=0$ if $S_4=0$
- $p=0.5$ catastrophe if 1 resource left: $E[C]=1/2$ if $S_4=1$

Preferences:

- Exploitation is individually rational (backwards induction)
- Conservation is Socially Optimal

$$V_t = 2R_t + 8/3C$$

- Resource extraction pays 2 units
- Stable climate pays 8/3 units (eg altruism)

Study the intertemporal social dilemma under different conditions

- Liberal (benchmark sequential DM)
- Certainty (any resource use causes catastrophe)
- Solar (costly investments prohibits FF extraction)
- Dictator (first player decides full game)
- Rawls (random player decides full game)

Two measures of success:

- (i) conservation
- (ii) payoff/efficiency

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Research questions:

1. Can we mimic intertemporal climate change dilemma?
2. Do policy interventions help (Certainty; Solar)?
3. Underlying preferences / cognitions (Dictator/Rawls)?
 - Viable 'ecological dictatorship?'

Study the intertemporal social dilemma under different conditions; **privately optimal play** (backward induction)

- Liberal: exhaustion
- Certainty: conservation to prevent catastrophe
- Solar: first player invests & extracts: still risk
- Dictator: first player extracts & restricts others
- Rawls: full conservation (social opt)

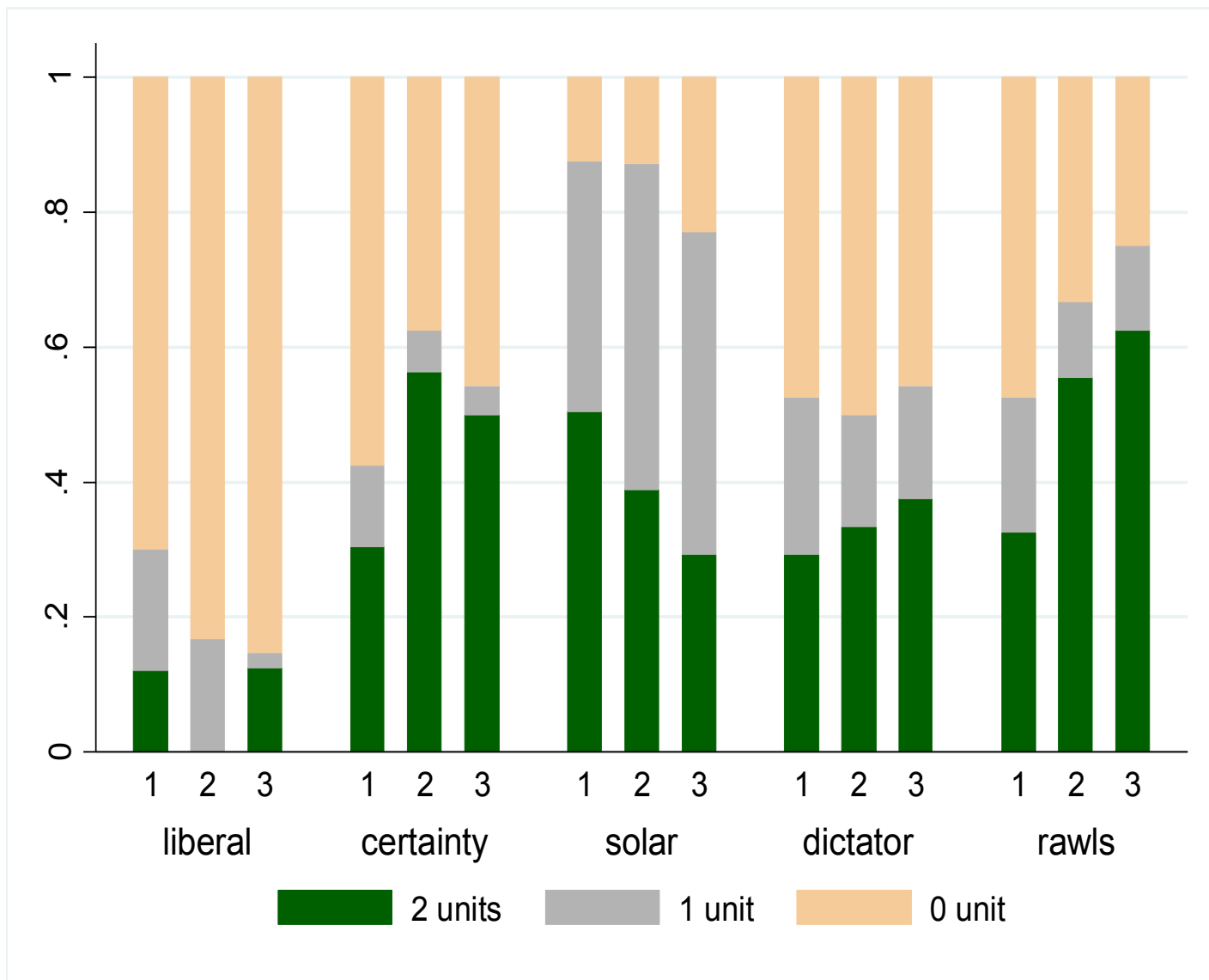
Experimental Implementation

Payment as before: $V_t = 2R_t + 8/3C$ times 3 Euros

3 stages

1. Play, no learning about other players' strategies
2. Vote and play
 - What game do players prefer/ do they pick the highest-payoff game?
3. Repeated play with learning
 - Does learning matter?

Results: Outcomes at group level; conservation



Results: group level, conservation & welfare

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable	\bar{S}_4^o	$E[S_4]$	1-2	\bar{S}_4^o	$E[S_4]$	4-5	$E[V]$	$E[V]$
Player-interaction	No	Yes		No	Yes		Yes	Yes
Stage	1	1	1	3	3	3	1	3
Liberal	41	21	20***	17	14	3	21	14
Certainty	51**	36***	15***	63**	52##	10	24	48
Solar	75***	69***	6***	54**	53**	1	57***	41**
Dictator	41	41***		46**	46**		41***	46**
Rawls	43	43***		69**	69***		43***	69***

- Observation 1: All conditions improve on Liberal in terms of conservation

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Rawls	43	43***		69**	69***		43***	69***

- Observation 2: All conditions (except Certainty) improve on Liberal in terms of Welfare

Results: Voting behavior

	(1)	(2)	(3)	(4)	(5)
Voted for	Liberal	Certainty	Solar	Dictator	Rawls
Observations / %	22 / 18%	23 / 19%	44 / 37%	12 / 10%	19 / 16%

- Solar most popular
- Rawls has highest expected payoff, but too difficult?

Conclusions

- Intertemporal social dilemma game relevant practical problem
- Reduced threshold uncertainty => improves outcomes despite worse environment
- Solar => improves outcomes despite being initially costly
- Solar popular institute (while neutral framing = no mention of solar)
- Decision Makers cannot commit to future carbon price, but through investments in Clean Energy Innovation, they can commit to future lower emissions.