Institutional dimensions of PES:
A very self-selective overview

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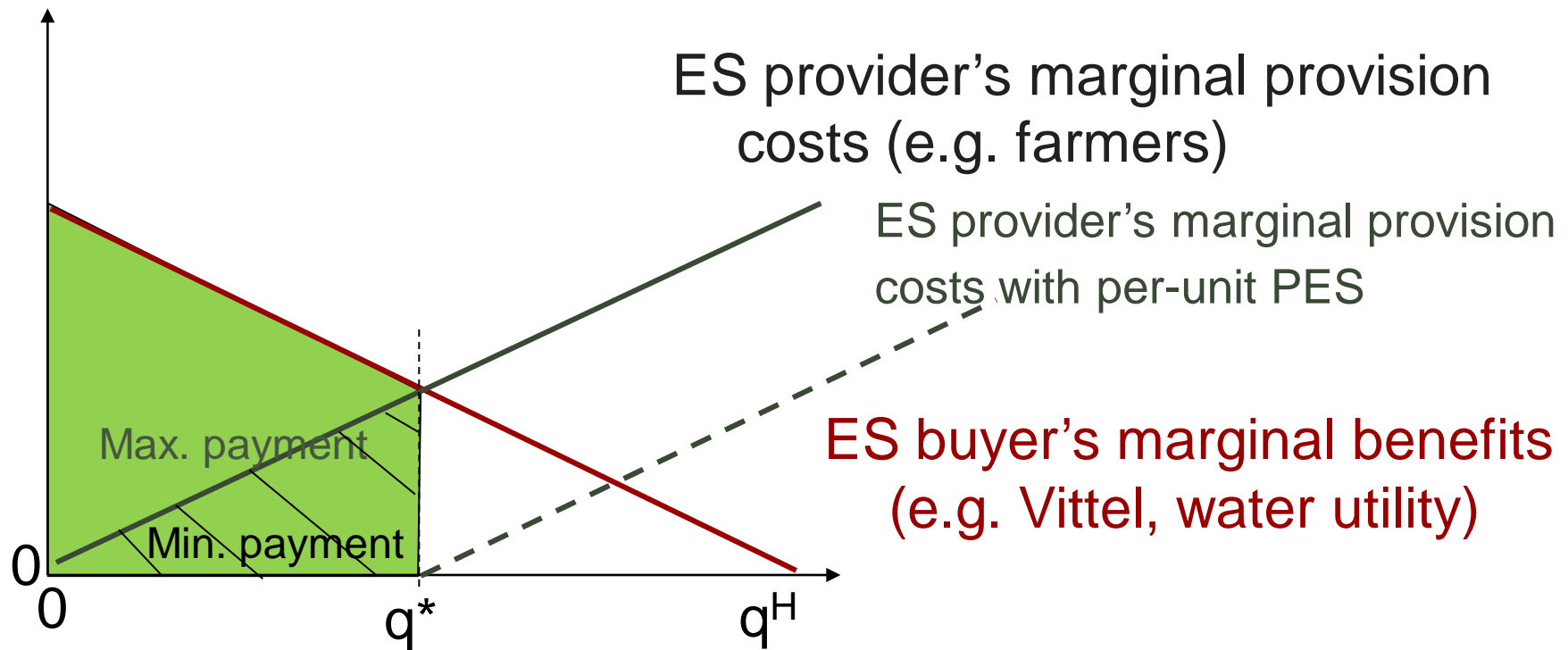Institute for Environmental Decisions, ETH Zurich

Outline

- Conceptualizing PES & Implications for the role of different actors in PES

- Payment design

  - Payment design across space (Targeting; Ex. Costa Rica)

  - Payment design across time (Permanence; Ex. Kenya)

  - Group payments (Ex. Sweden)

  - Other issues

- Concluding remarks
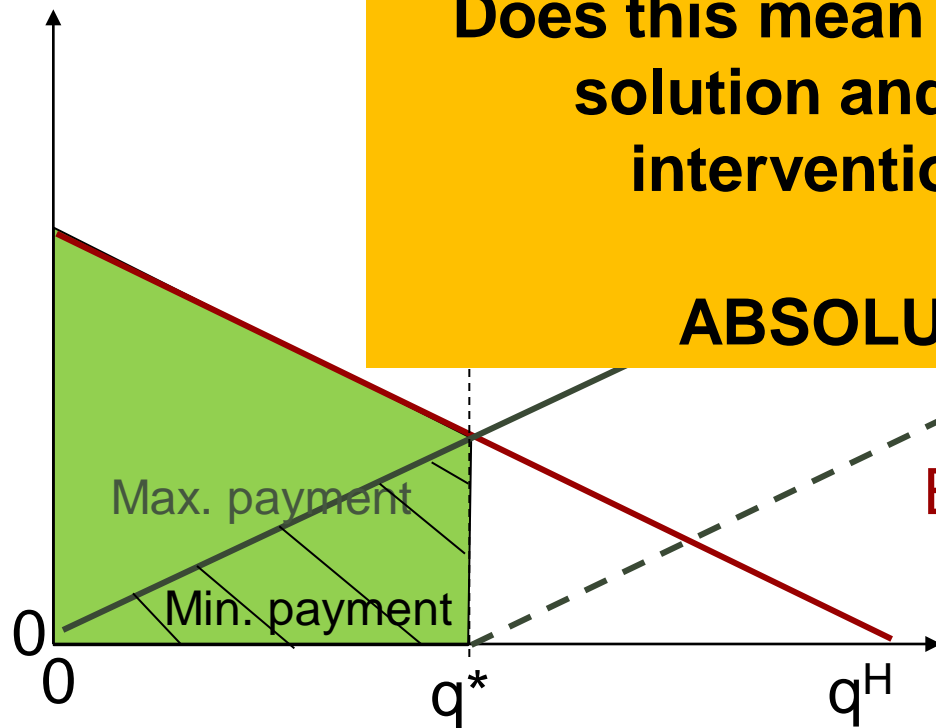
Conceptualizing PES as a ‚Coasean negotiation'

Price (Eur)

ES provider's marginal provision costs (e.g. farmers)

ES provider's marginal provision costs with per-unit PES

Max. payment

Min. payment

ES buyer's marginal benefits (e.g. Vittel, water utility)

0

0

q^*

q^H

Quantity of ES (e.g. nitrate pollution reduction)

Conceptualizing PES as a ‚Coasean negotiation'

Price (Eur)

Does this mean that PES is a free market solution and that we do not need intervention by third parties?

ABSOLUTELY NOT!!!!!!!!!!

Max. payment

Min. payment

ES buyer's marginal benefits (e.g. Vittel, water utility)

0

0   q*   q^H

Quantity of ES (e.g. nitrate pollution reduction)

Implied key conditions required for PES to emerge without third-party intervention:

- **Well-defined property rights** in favor of ES providers → contradicts 'polluter-pays principle'; often weak PR

- **No (or low) transactions costs** → Can be high, particularly when population of potential ES buyers and/or sellers is large and scattered

- **No free-rider effects** → Many ES are public goods; incentive for free-riding increases with # of potential ES buyers

- **Perfect information** → Information on others' benefits and costs often imperfect, inducing potential for strategic behaviour & misstatement

Role of third parties (Government, NGOs, International organizations, …) in PES

- **Define and enforce property rights** (G, N, I)

- **Reduce transaction costs** (identify, organize & represent ES buyers or sellers, serve as intermediary in negotiatons, provide administrative structure, bundle funds, monitor compliance) (G, N, I)

- **Overcome free-riding** through charging compulsory user fees (e.g., water tariff, tourism fees) (G)

- **Provide information** on ES, costs & benefits (G, N, I)

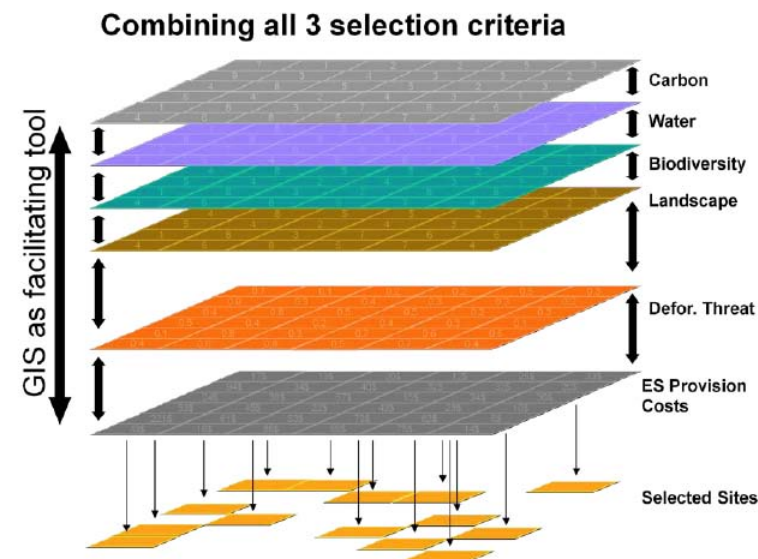- Or even **run the scheme** (e.g., government-financed PES)

> **PES as a continuum between pure Coasean solution & environmental-subsidy-like intervention** (Engel et al. 2008; cf. Vatn 2010)

Payment Design

- **Payment Design across Space (Targeting)**

- **Payment Design across Time (Permanence)**

- **Group Payments**

- Other issues, e.g.

  - Cash vs. in-kind (e.g., Zabel/Engel *Ecol Econ* 2010)

  - Performance indicators (e.g. Zabel/Roe *Ecol Econ* 2009)

  - PES design under weak property rights (e.g. Engel/Palmer *Ecol Econ* 2008, *ERE* 2011)

Payment design across space: Results from Costa Rica (Wünscher/Engel/Wunder 2008)

- # of applications >> available budget; site selection on first-come-first-serve basis based mostly on priority areas; fixed payments

- Low additionality (e.g. Sanchez-Azofeifa et al. 2007; Arriagada et al. 2009)

- Simulation of change in ES obtainable with given budget if targeting sites according to (i) benefits, (ii) threat, (iii) costs

Combining all 3 selection criteria

GIS as facilitating tool

Carbon
Water
Biodiversity
Landscape
Defor. Threat
ES Provision Costs
Selected Sites

Results for Nicoya Peninsula, Costa Rica

	Baseline	ES only	Ignoring threat	Ignoring costs	Full Targeting
Payment	Fixed	Fixed	Flexible	Fixed	Flexible
Selection Crieria	Priority Area	ES Score	Score/Cost Ratio	ES Score*Def. Prob.	ES Score*Def. Prob. /Cost
Total Cost (US$)	30,284	30,012	29,997	30,016	30,014
No. of Sites	20	36	62	37	56
Area (ha)	750.7	750.3	1423.3	750.4	1350.2
Mean Site Size (ha)	37.5	20.8	23.0	20.3	24.1
ES Score (total)	52,148	57,770	98,259	57,156	94,829
ES Additionality (ES Score*Def. Prob.)	1,969	2,253	3,909	2,294	4,033

> Total **ES score and ES additionality both approximately double**, with given budget, when considering all 3 targeting criteria

> Most potential for efficiency gain in Costa Rican case comes from flexible payments considering costs of ES provision

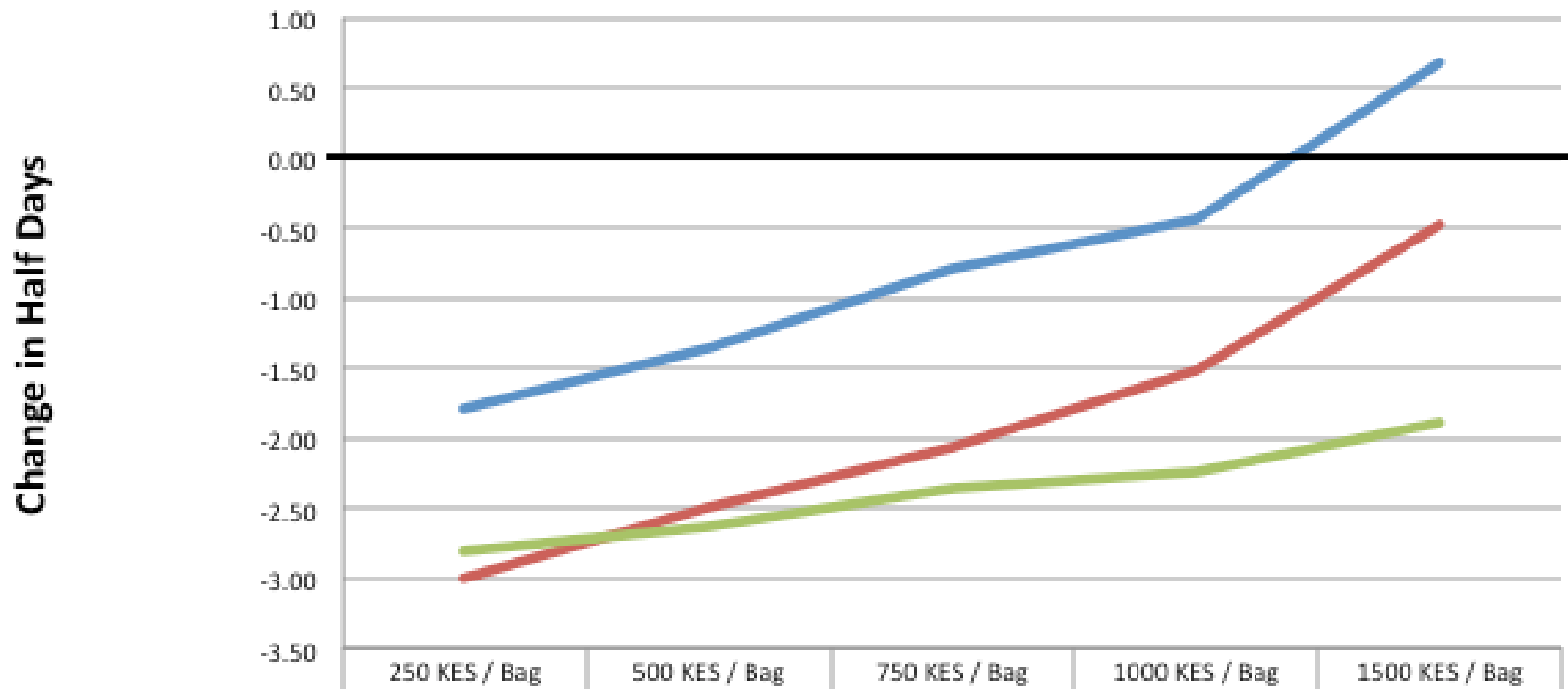> Approaches needed to reliably estimate provision costs (e.g. auctions)

Payment design across time: Permanence in REDD+

- Permanence of emission reductions as crucial issue in REDD+; at risk due to increasing opportunity costs (increase in demand for food and biofuels)

- Idea of coupling REDD+ payments to agricultural price index (Benítez et al. 2006, Dutschke/Angelsen 2008)

- Real options modelling and simulations indicate considerable cost saving potential for given level of permanence vis-à-vis indexing to carbon prices (Engel/Palmer/Taschini/Urech 2011)

- Study of world's first REDD project certified under internationally accepted standard (Kasigau corridor, Kenya; see Schlöndorn/Veronesi/Zabel/Engel 2011 → Session 4B)

Results from a choice experiment with >1000 households

Change of half-days spend charcoaling vs. status quo

	250 KES / Bag	500 KES / Bag	750 KES / Bag	1000 KES / Bag	1500 KES / Bag
Jojoba Scenario	-1.80	-1.35	-0.79	-0.43 ⭐	0.69 ⭐
Fixed Price Ecochar	-3.00	-2.49	-2.07	-1.51	-0.48 ⭐
Indexed Price Ecochar	-2.81	-2.62	-2.36	-2.24	-1.88

Results from a choice experiment with >1000 households

Change of half-days spend charcoaling vs. status quo
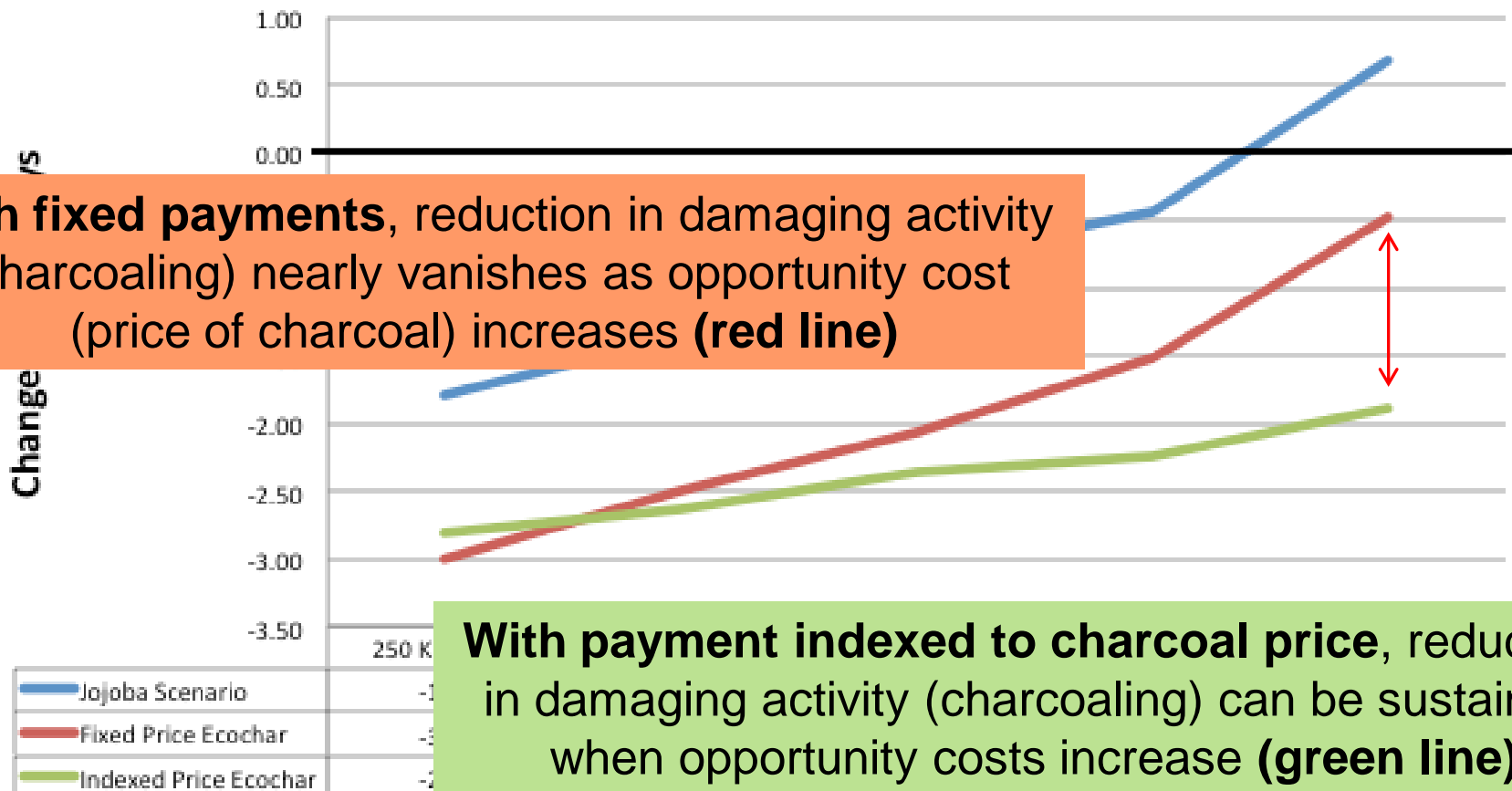
With fixed payments, reduction in damaging activity (charcoaling) nearly vanishes as opportunity cost (price of charcoal) increases **(red line)**

With payment indexed to charcoal price, reduction in damaging activity (charcoaling) can be sustained when opportunity costs increase **(green line)**

Legend:
- Jojoba Scenario
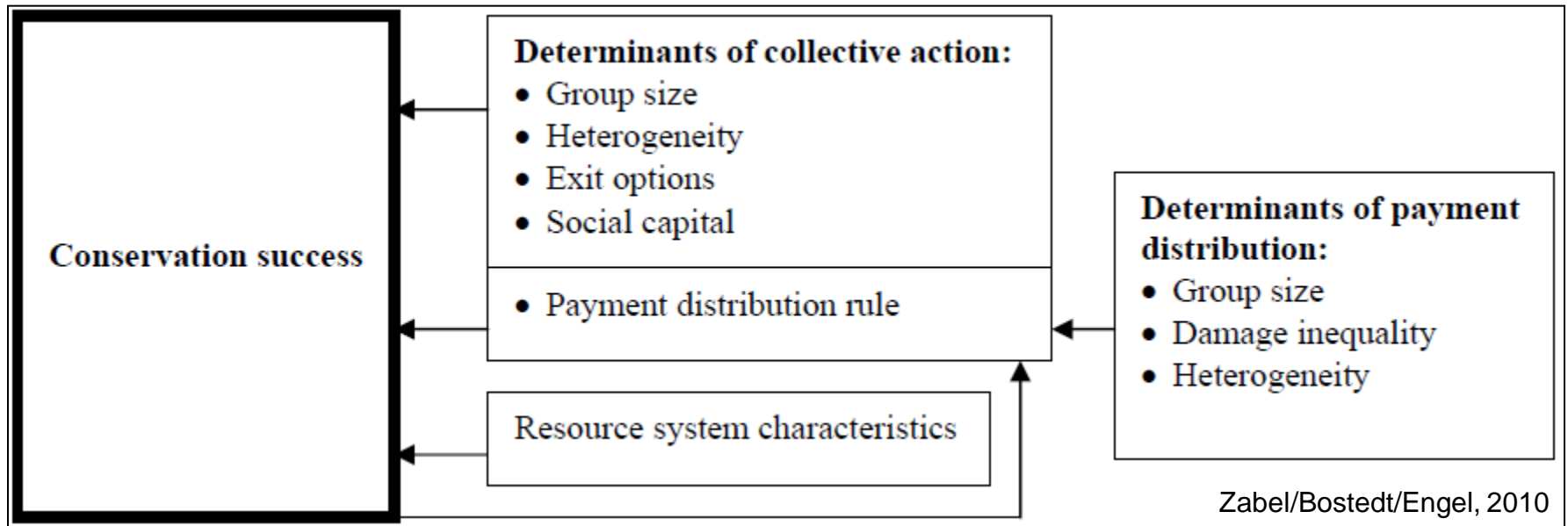- Fixed Price Ecochar
- Indexed Price Ecochar

Group payments: Results from Sweden

(Zabel/Bostedt/Engel, 2010)

- Environmental outcome often not attributable to individuals due to nature of ES or property rights

➢ Payment based on group performance

➢ Group as collective ES seller faces common pool resource (CPR) dilemma

- *Ex. National performance payment scheme for carnivore conservation in Sweden*
  - Group payments made to indigenous reindeer herding Sami villages based on carnivore offspring on village territory
  - Survey of 50 Sami villages; mail survey of 970 reindeer owners (response rate 41%)

Conservation success with group payments

	Determinants of collective action:
	• Group size
Conservation success	• Heterogeneity
	• Exit options
	• Social capital
	• Payment distribution rule

Determinants of payment distribution:
- Group size
- Damage inequality
- Heterogeneity

Resource system characteristics

Zabel/Bostedt/Engel, 2010

- With group PES: benefit distribution (payment distribution rule) endogenously determined by village members!

- Theoretical model of village voting on payment distribution

Group-internal distribution of payments:
Share of group payment redistributed to individual herders (remainder invested in village commons)
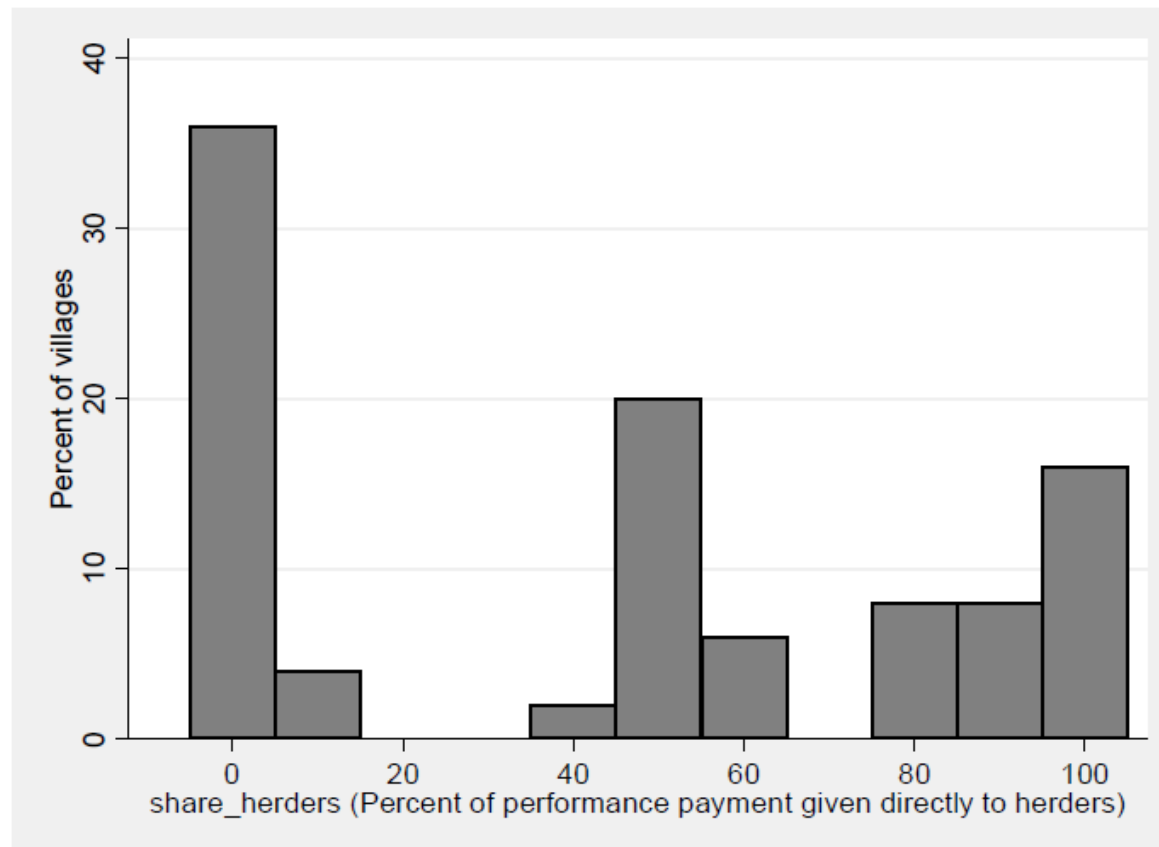
Zabel/Bostedt/Engel, 2010

Econometric analysis

VARIABLES	(3a) 2SLS (first stage) Share_herders	(3b) 2SLS Lynx	(3c) OLS Lynx	(3d) OLS Lynx
Share_herders (+/-)		69.35*	31.80**	
		(41.691)	(13.320)	
Group_size (-)	0.006**	-0.835**	-0.570**	
	(.003)	(.373)	(0.245)	
Gini_herd (-)	0.024	-37.56	-36.45	
	(.411)	(34.107)	(33.701)	
Exit_option (-)	0.0001	-0.215	-0.232	
	(.002)	(.195)	(0.192)	
Social_capital (-)	0.073	-4.247	-1.325	
	(.069)	(6.577)	(5.750)	
Forest (+)	0.015	6.858***	7.377***	8.526*
	(.025)	(2.125)	(2.030)	(1.89
Damage_inequality (+)	0.244*			
	(.123)			
Constant	-0.166	45.45*	45.84**	9.82
	(.274)	(21.516)	(21.269)	(6.76
Observations	41	41	41	50
R-squared	0.301	0.369	0.489	0.29
Adj. R-squared	0.178	0.258	0.398	0.28

- Collective action potential matters for conservation success

- Success greater where group redistributes payment to individual members based on herd size

Dep. Vrbl. Lynx offspring 1996-2006 per village (min=0, max=141, mean=33.4)

Econometric analysis (dep. vrbl.: Lynx

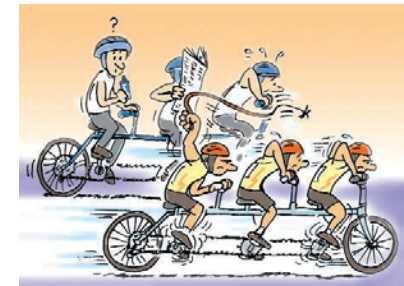| VARIABLES	(3a) 2SLS (first stage) Share_herders	(3b) 2SLS Lynx	(3c) OLS Lynx	(3d) OLS Lynx
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2 effects of group size on conservation success:

Larger groups more likely to vote for redistribution of payments to individuals (+)

Larger groups have lower collective action potential (-)

Concluding remarks

- Most PES do not emerge as free-market solutions and there are good reasons why

- Important roles for government, NGOs, international organizations, … in facilitating and/or implementing PES

- Much improvement potential in efficient use of scarce funds through careful payment design → Need to spread lessons learnt (but also understand hurdles/political economy)

- More research needed, for example, on Implications of behavioral economics for PES
  - e.g., activating norms,
  - external vs. Internal monitoring/sanctioning,
  - crowding out

THANK YOU!