Implementation challenges in PES schemes

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outline

- Why do we need to create environmental markets?
- Markets with a single buyer: examples, challenges
- Markets with multiple buyers: example, challenges

Why do we need to create environmental markets in the first place?

- Because of market failure and missing markets with respect to ecosystem services
- Problems with property rights
- Non-rival and non-excludable benefits means we get too few environmental goods and too many environmental bads in the absence of (government) intervention

One buyer, many sellers

- Typically, Government establishes the PES scheme, acting as a buyer on behalf of all beneficiaries
- Typically, offers a uniform payment for contract to undertake specified management actions thought to “produce” environmental benefits, eg biodiversity increase, water quality improvement, reduction in flood risks
- May be spatially-differentiated in terms of who can apply and how much they get paid
- Payment rates usually set at average cost / profits foregone

But this implies…

- Ignore variations in supply price across producers ➔ over-reward all but marginal landowner
- Ignore variations in “ecological productivity” of land
- Ignore variations in supply price according to quantity of environmental good produced
- Main implication: buy less environmental outputs for a fixed budget

One buyer, auction format

- Government is typically the single buyer, but other possibilities exist
- Declares a demand for the “good” and invites bids from potential sellers
- Lowest prices win the contracts (perhaps adjusted for expected environmental performance)
- Examples: conservation auctions (reverse auctions) eg various trials under MBI programme in Australia for native bush conservation; Conservation Reserve Programme in US.

advantages

- Cost effective: compared to uniform subsidy schemes, means lowest cost suppliers participate
- Generate information: bids reveal the “type” of landowner to the government (high versus low cost)

Problems with conservation auctions

- Transactions costs of running auctions
- If contract is over land management actions, will this deliver expected environmental benefits?
- Can the auction discriminate effectively over expected environmental outputs anyway?
- Spatial coordination: if environmental benefits depend on spatial spill-overs (eg establishing corridors; landscape-scale ecological benefit functions). Can auctions achieve such co-ordination?
- Collusion amongst bidders

Other design options

- Agglomeration bonus
- Varying contract length
- Paying for outputs rather than management actions
- Mixed schemes

Costs of policy simplifications

- We know that the “optimal” design of a PES scheme could be quite complex
- Since it would recognise variations in true supply price across producers, and for any given producer, and in ecological productivity across land
- But more complex schemes are more expensive to adminster
- So how much is it worth spending on a more complex scheme?
- Armsworth et al, *Ecology Letters,* forthcoming; Hanley et al, *Land Use Policy,* forthcoming.

model

- 3 farm regions (“catchment-wide farms”)
- Behavioural assumption: constrained optimisation model (max profit)
- Main production activities plus associated net pay-offs
- Resource constraints and input demands
- Subsidy payments and associated constraints on activity
- Non-linear regression models relating land use to bird densities uses stocking rates, fertiliser use and intensity of grassland management as predictors (Dallimer et al, Jnl.App.Ecol., 2009, Biol.Lett., 2010).
- Parameters incorporated into optimisation model as a set of index-specific ecological production functions

Costs of non-optimal policy

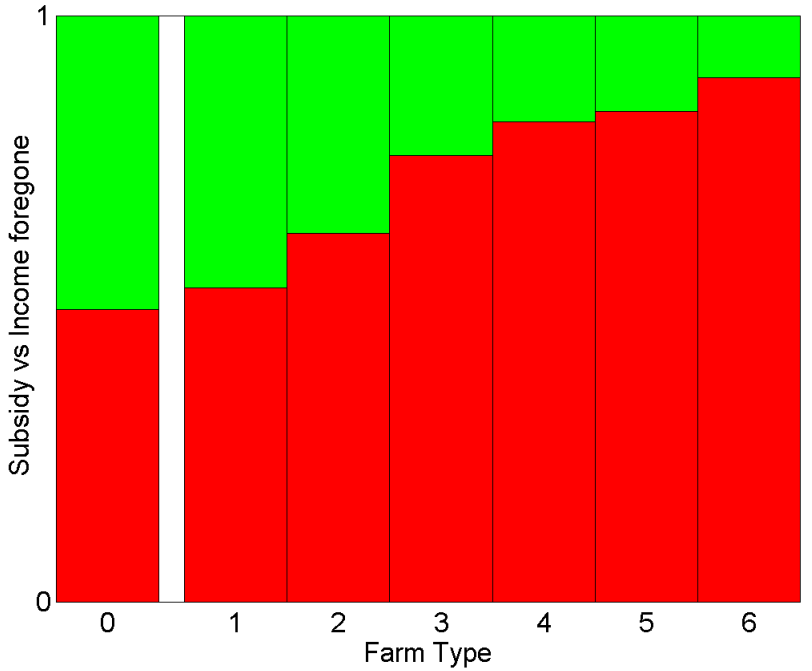
- Minimising costs of hitting a given biodiversity target requires:-
  - Payment varies across farmers
  - Varies across regions (dark peak, south west peak, eastern moors)
  - Varies for individual farmers according to quantity of biodiversity produced
- For a given conservation budget, we investigate how much **less** biodiversity can be “bought” if each of these complications are ignored.

Are the existing conservation investments cost effective?

Comparing incentive payment to income foregone when allowing farm business to reconfigure.

£ 0.54 – 0.89 per £ 1 is "pure subsidy". Remainder is compensation for income foregone.

VERY INEFFECTIVE.

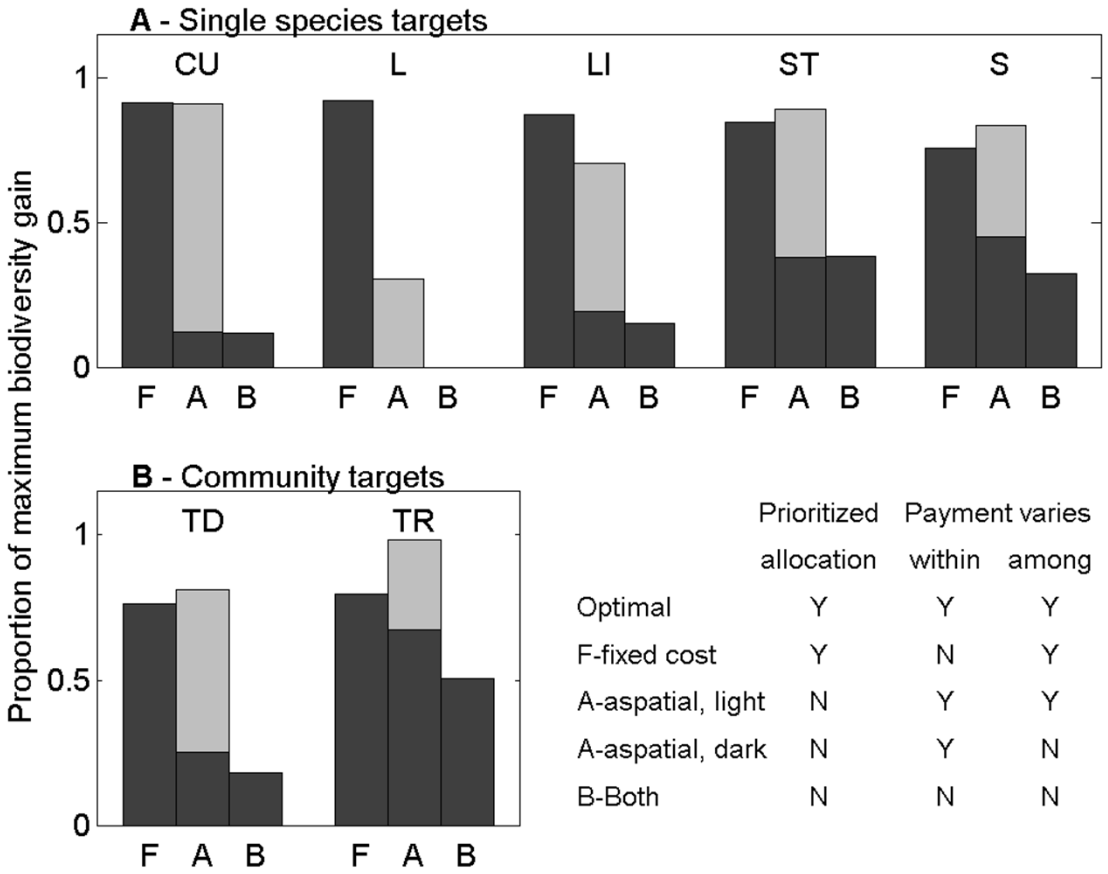


6 representative farm types based on habitat & enterprise mix

3 types of simplification

- F – fixed rate. Allow variation in payments and budgets across regions, but within region there is no variation – fixed price irrespective of how much biodiversity is produced
- A – aspatial. Allow payments to vary within a region, but either (i) payment rate and budget allocation can vary optimally across regions (ii) only budget allocation varies, but payment set at MC of “most expensive” region
- B – both A and F simplifications are applied

Figure 3



	Prioritized allocation	Payment varies within	Payment varies among
Optimal	Y	Y	Y
F-fixed cost	Y	N	Y
A-aspatial, light	N	Y	Y
A-aspatial, dark	N	Y	N
B-Both	N	N	N

"prioritized allocation" refers to budget

- Failure to exploit low-cost gains made possible by spatial variation in payments across regions are particularly costly.
- Optimal budget allocation across regions also matters
- However, schemes that set payment rates that vary with the amount of biodiversity produced on a property can be sacrificed for relatively small reductions in conservation gains.
- We find that rather large fractions of total policy cost could be spent on implementing more complex schemes (eg up to 70%) and still come out ahead

conclusions

- Common policy simplifications in agri-environment scheme design greatly reduce the biodiversity benefits on offer, but optimally designed policies would be expensive to implement.
- A balance is therefore needed that incorporates simplifications to scheme design to reduce implementation costs without resulting in major sacrifices in conservation outcomes.
- Our approach provides a means for identifying such simplifications.
- We find that rather large fractions of total policy cost could be spent on implementing more complex schemes (eg up to 70%) and still come out ahead

Many buyers, many sellers

- Government sets up the market by creating tradeable entitlements
- Can be related to a “cap” or “floor” on actions
- “firms” can buy and sell these entitlements
- Demand and supply creates a market
- Potentially *efficient* solution for environmental policy, since results in a price being set for environmental actions.
- Can also increase returns to land management
- Internationally, can result in financial transfers to developing countries

- Most obvious example: pollution permits (cap and trade) eg sulphur trading in US.

- Others:
  - Wetlands banking;
  - species banking (red cockaded woodpecker habitat);
  - carbon trading related to land use;
  - point-nonpoint pollution trading for nutrient pollution reductions

But…

- How to initially allocate rights? Choice can create problems from rent seeking.
- Transactions costs of trading and enforcement
- Duration of entitlements
- Spatial coordination again
- Market power

What would be useful.

- Knowing under what circumstances environmental markets work best
- Knowing how to resolve problems noted on previous slide
- Pilot projects in UK, learning from experience in US and Australia.

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