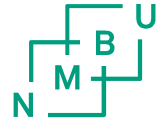


Innovative economic instruments – breaking the information deadlock in NPS regulations

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Background and motivation (1)

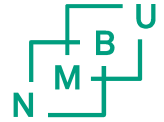
- NPS-problem
 - Observing emissions – costly and technically difficult
 - → current regulations on observable factors
 - ◆ inputs
 - ◆ management practices
 - Focus not on reducing emissions at least cost
 - unlikely to achieve cost effective emissions reductions

... background and motivation (2)

- Solution: breaking info.problems of NPS
= do not rely on measuring individual farm emissions
- Ambient standards (Segerson JEEM 1988)
- Proxy emissions based instruments
 - Collectively measured farm level emissions
 - Modeled farm level emissions

Outline

- Conventional NPS policies
 - “Best management” policies
 - Input based policies (ex. fertilizer taxes)
- Ambient polices
- Proxies for individual farm level emissions
 - Teams
 - Modeled contracts
- Economy wide issues – market impacts

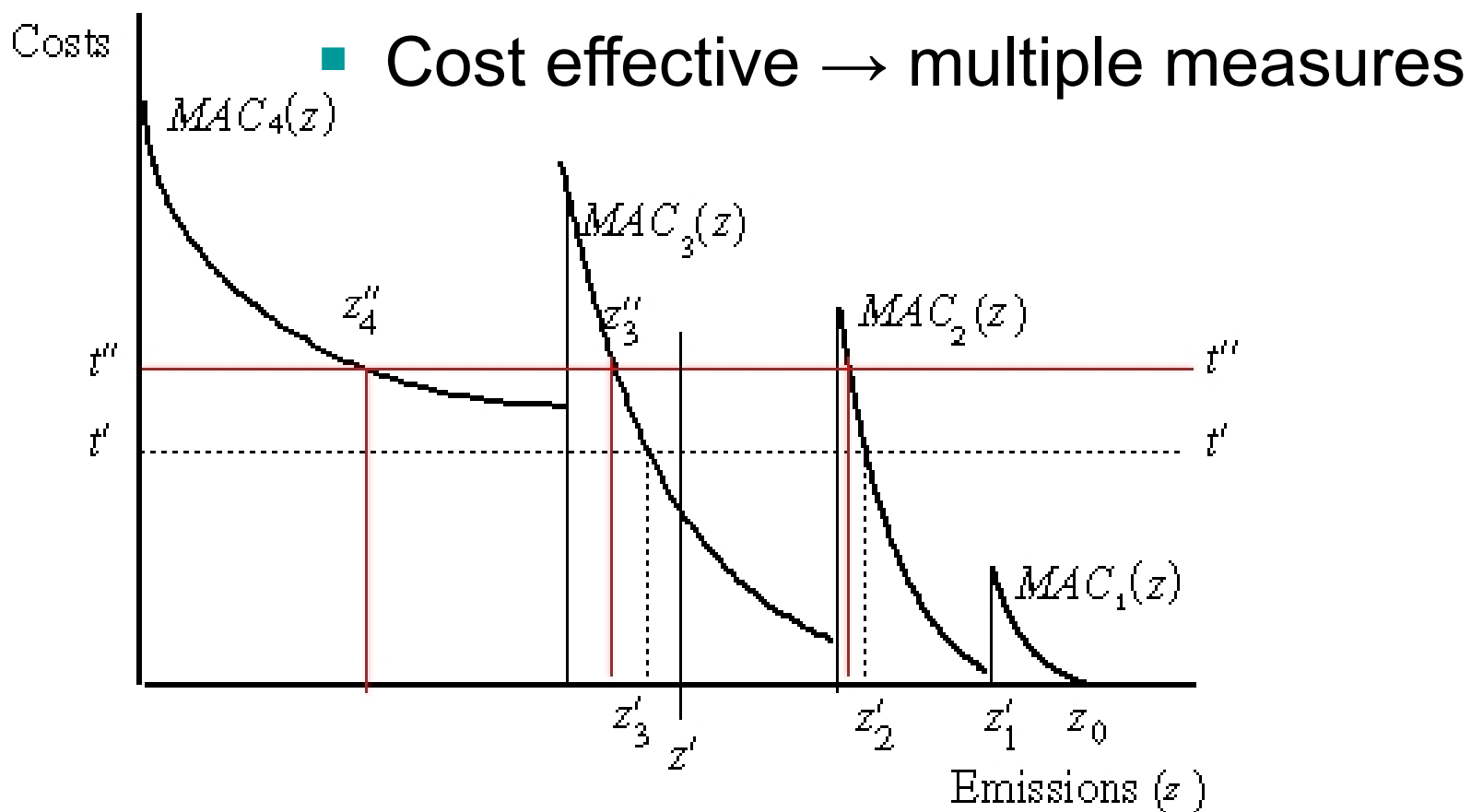


The NPS information problem (1)

- Individual farm emissions technically difficult or (too?) costly to obtain
 - conventional NPS – not emission based
 - not cost effective in emissions space
 - Best management practices
 - Input use oriented
- Reason: incentives not on emissions, but something else ...

... the NPS information problem (2)

- Not cost effective in emissions space

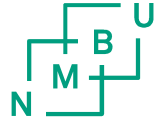


Ambient standards (1)

- Segerson (JEEM 1988)
 - Ambient standard = environmental quality in the recipient
 - Tax equal to agents' marginal damage
- Main problems
 - Excessive taxation → incentives too strong?
 - Incorrect entry-exit incentives
 - High monitoring costs
 - Ambient quality → delayed response in recipient

... ambient standards (2)

- Follow-ups
- Cabe & Herriges (JEEM 1992)
 - Lower monitoring costs ← ambient concentrations measured in a Bayesian framework
- Hansen (ERE 1998), Horan *et al.* (JEEM 1998)
 - More correct entry-exit ← lump sum pay backs
 - → less info.demanding than the Segerson mechanism



... ambient standards (3)

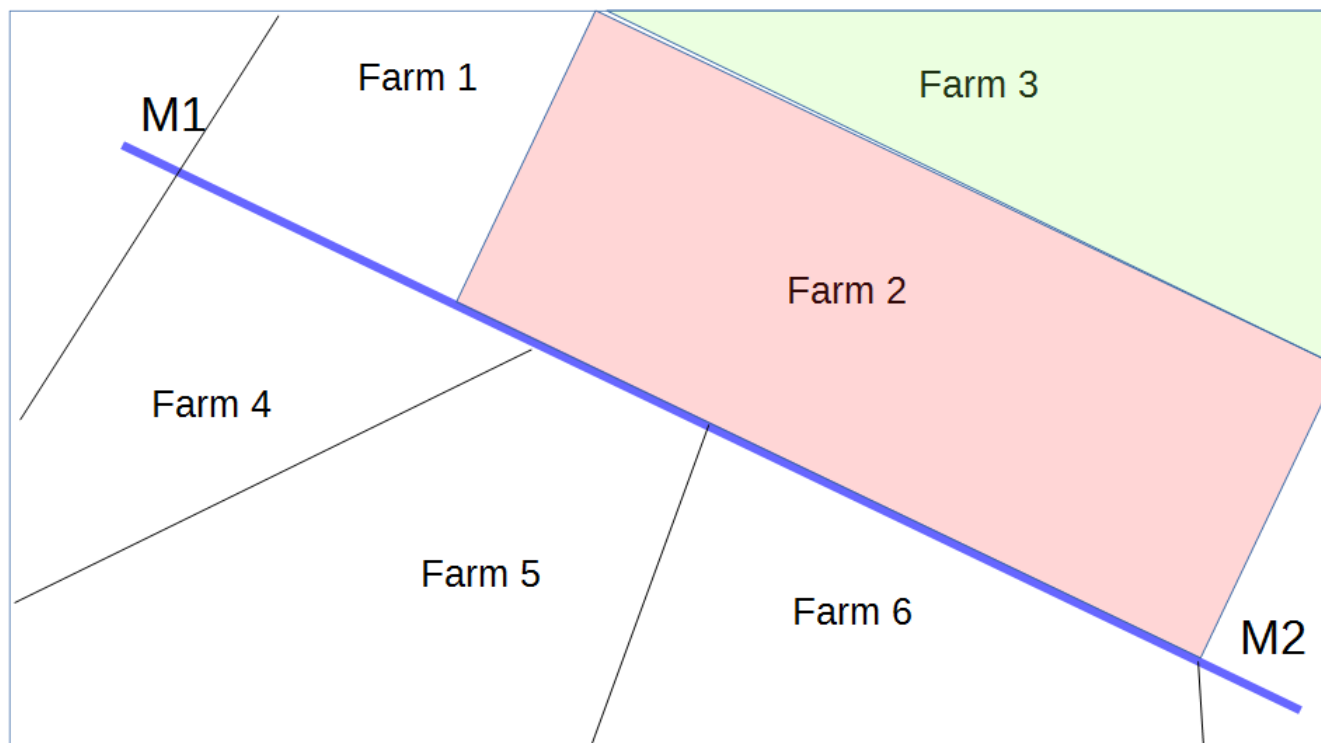
- ... follow-ups
- Hansen & Romstad (EcolEcon 2007)
 - Information efficient self-reporting robust to cooperation
 - Correct exit-entry incentives
 - Not completely resolved - Information flow among agents

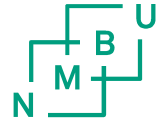
Proxy emission emission policies

- Main principle: avoid costly measurement of individual farm level emissions
 - Teams approaches (Romstad EcolEcon 2003)
 - Contracts on modeled emissions (ongoing)
 - Extra contracting issue – who is responsible for the acts of Nature?

Teams approaches (1)

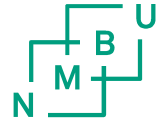
- Main idea: incentives for collectives of farms to control emissions





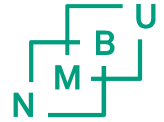
... teams approaches (2)

- Principle – contract offered
 - Farms in team within a sub-watershed collectively responsible M1-M2 emissions
 - Internat team trades
 - Payoffs: $\pi_{Con+comp} > \pi_{No-con} > \pi_{Con+no-comp}$
- Details
 - Exit option if a team member cheats
 - Dynamically repeated game → Folk theorem: non-coop game sustained as cooperative



... teams approaches (3)

- Further contracting issues
 - Penalty for non-compliance
 - “Responsible for nature”?
- Limitations
 - Applicable to “small” watersheds” (not too many agents as “social cement” breaks down)
 - Requires good measurements (increase in emissions/measured concentrations between measuring points – M1/M2 in “map” slide 11)

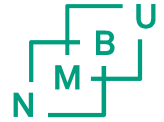


Contracts modeled emissions (1)

- Farmers sign contract where they are compensated/penalized for modeled emissions
- How it works
 - Farmers get access to models that calculate farm level emissions based on:
 - ◆ Farm's natural conditions
 - ◆ Self reported management decisions

... modeled emissions (2)

- Challenge: nature (weather)
 - Things not always as planned:
yields / emissions
plan NE actual activities → extra self report
- Yields and emissions inversely correlated
 - Low yields and farmers penalized for high emissions → larger downside in profits
 - → risk issues → higher “up front payment”



... modeled emissions (3)

- Further contracting issues
 - Risk compensation
 - Treating unnaturally high model estimates?
 - ◆ ← model errors (modeler humbleness)
 - ◆ Solution: max modeled penalty
 - False self reports on planned/actual activities
 - ◆ Solution 1: random checks
 - ◆ Solution 2: consistency with watershed - measured & modeled

Emissions – further contract issues

- Farmers responsible for nature's actions?
- Arguments in favor
 - Damages are real → welfare of damages
 - Responsibility → farmers have damage
- Arguments against
 - Risk further augmented → farmer reluctance to contract (or require extreme high payment)
 - Breaks with what is perceived “reasonable”

... further contract issues (2)

- Offer 2 contracts on treating Nature
 - Contract 1: Farmers are liable
 - Contract 2: Farmers not liable
 - Auctions → difference in bids = WTA liability
- Extra benefits contract framework
 - Self selection who contracts → information on who perceives themselves as heavy polluters
 - → where (whom) to monitor more/less

Economy wide (GCE) issues (1)

- Issue: strong environmental policies
→ produced quantity → commodity prices
- Ag-env (partial equilibrium) models
 - Detailed production processes, farm decisions
 - Assumes prices fixed
- Economy wide (CGE) models
 - Stylized on micro level
 - Endogenous prices

... economy wide issues (2)

- Computationally difficult/demanding to simultaneously model detail at micro with endogenous prices/structure at macro
 - Bridging micro and macro
 - Iterative PE and CGE until convergence
 - Not fully tested at EU-level
- Work continues in Seamless Association (Dominguez-Perez / Heckeley)

Concluding remarks

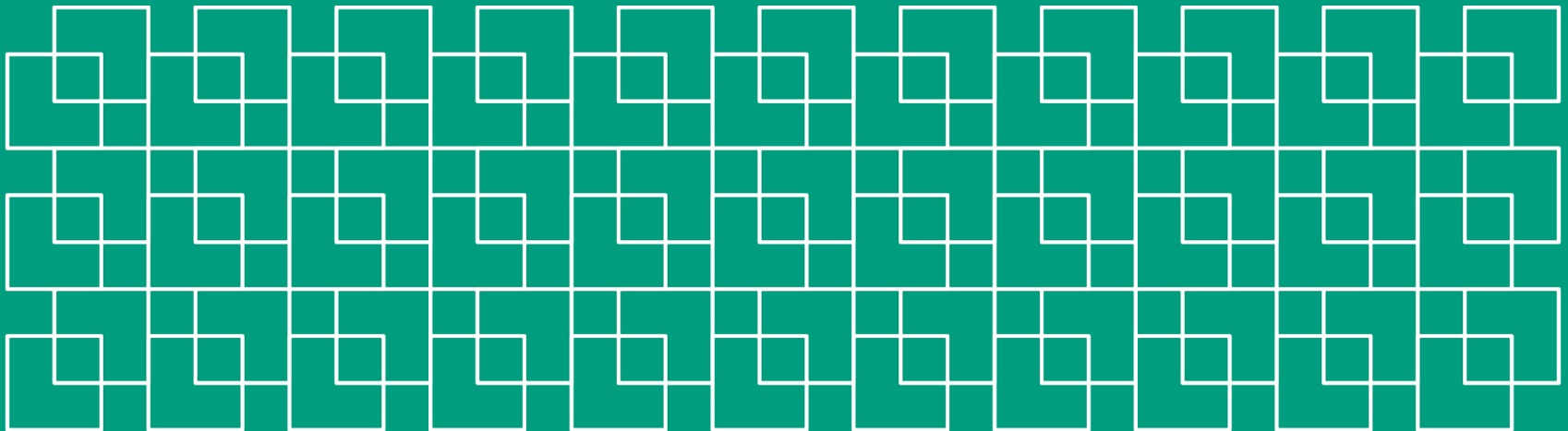
- Conv. NPS policies – ill-placed incentives
→ not cost effective in emissions space
- Breaking the NPS problem ← contracts
 - Teams
 - Model based emissions
- Bridging micro and macro models needed to handle ambitious env.policies (that will have price impacts)

... concluding remarks (2)

- Taking welfare seriously
 - Agriculture cannot “hide behind” that nature is difficult
 - → must have policies to resolve emission variations due to nature
- Solution: two types of contracts
 - With accountability for nature's whims
 - Without accountability for nature's whims
 - Price difference → WTA nature's whims

Take home messages

- management practices / input policies not cost-effective
- contracts / incentives on emissions → breaking NPS info. difficulties
- flexibility and info. benefits of contract framework



Literature

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