Lecture 4 - supplement: Marginal damages and benefits

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  - total and marginal functions
  - public goods - some repetition
  - natural science and economics perspectives on benefits/damages
  - comments on optimality in partial equilibrium

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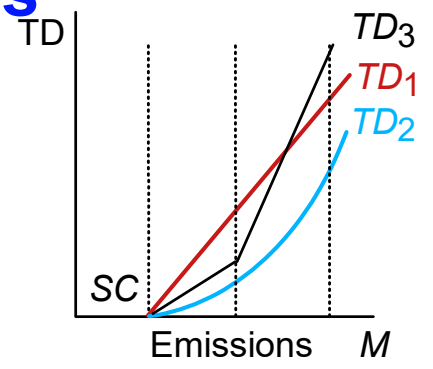
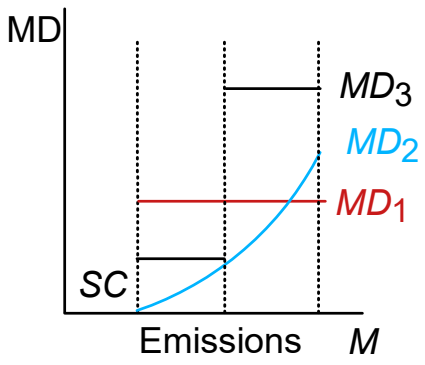
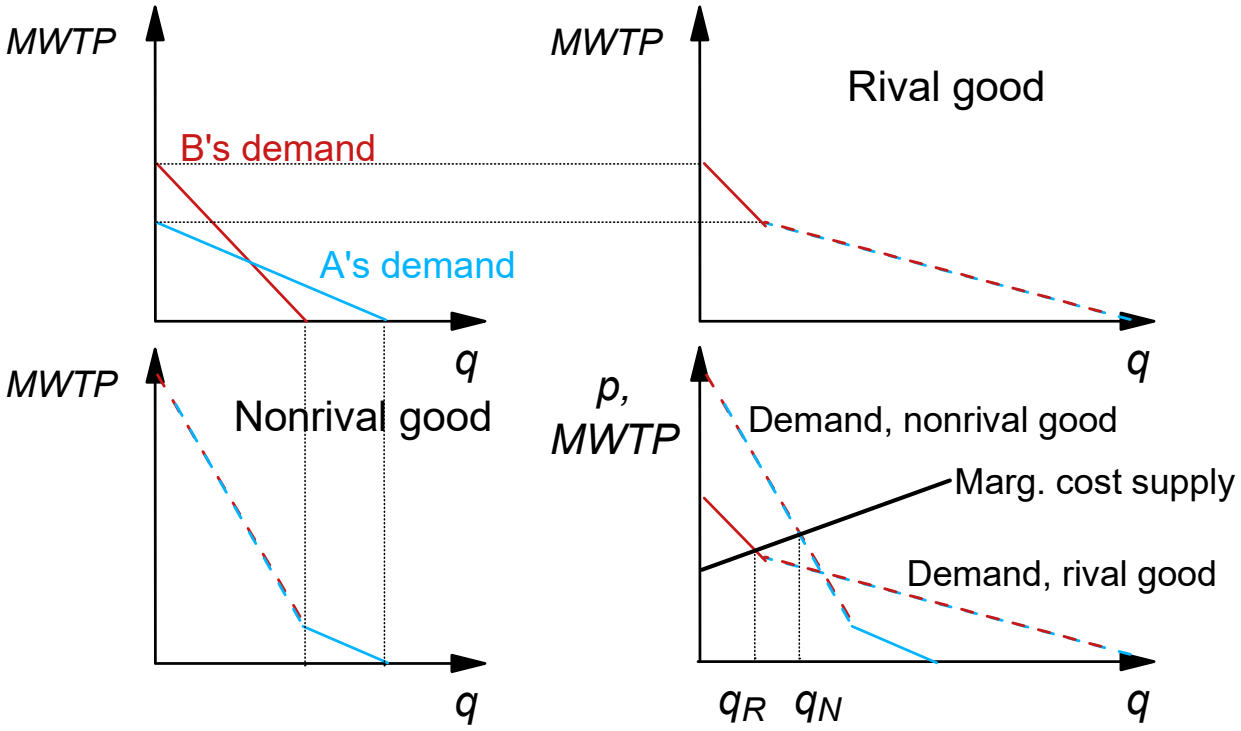
Environmental damages

- Total damages: *TD*(*M*)
- Self cleaning capacity: *SC*
- Marginal damages: *MD*(*M*)
- Damage scenarios:
  1. Linear damages
  2. Convex (std.) damages
  3. Kinked damages
- Physical units *MD*(*M*) → Monetary units *MEC*(*M*) a monotonic transformation

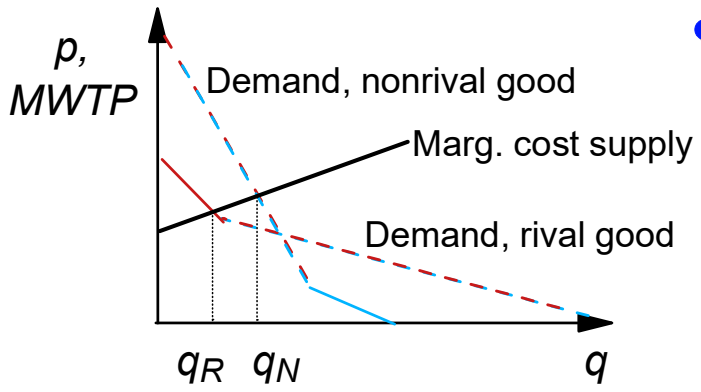




Optimal public goods levels (1)



... optimal public goods levels (2)

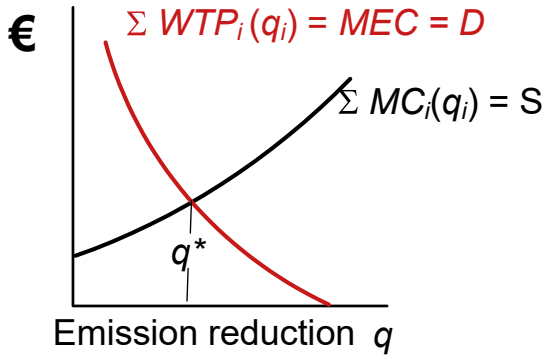


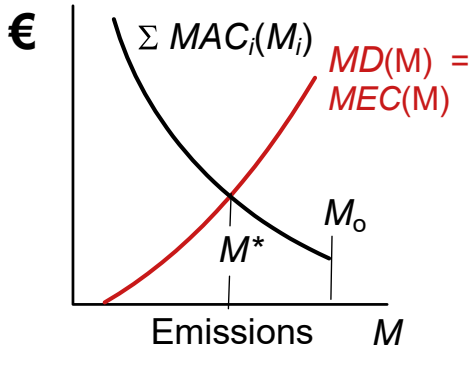
- Optimal emissions: $MEC(q) = \Sigma\, MAC_i(q_i)$
  - horizontal sum of ind. agents marg. abatement costs
  - vertical sum of ind. agents marg. damages
- Implications:
  - opt. amt. of nonrival goods could be non-zero for such high costs that the rival opt. amt. equal zero
  - opt. amt. of rival goods is generally higher at low costs than for nonrival goods

... optimal public goods levels (3)

- Private goods: have public prices
- Public goods: have private prices
  - private prices arise because of no-excludability
  - problems: free-riding, finding the demand for public goods
    - − valuation methods: contingent valuation / hedonic pricing method / travel cost method
  - Lindahl prices = everybody pays according to their marginal value
    - \+ produces right prices in theory
    - − no incentives to participate (best not to take part)

... optimal public goods levels (4)

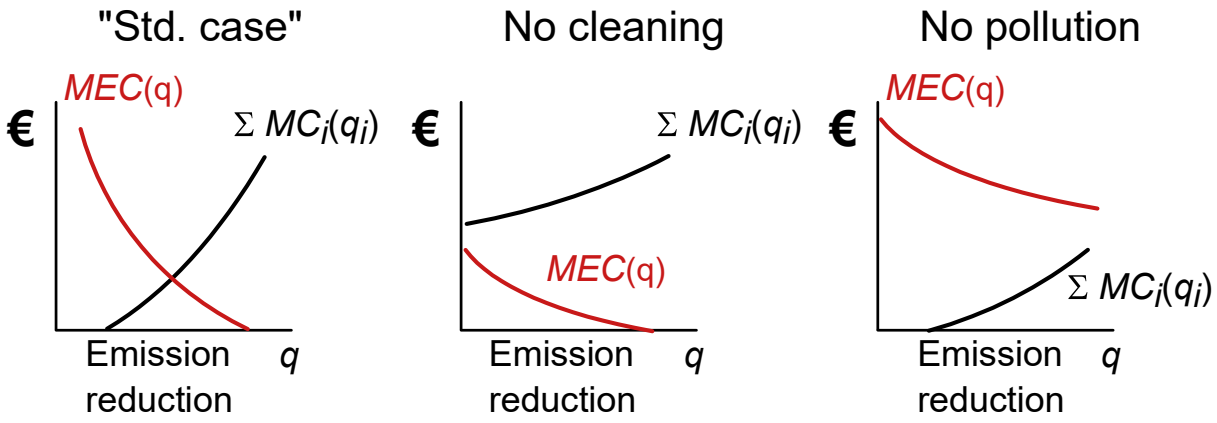




- Two perspectives:
  - "talk to economists": demand for environmental goods (like reduction in emiss, q)
  - "talk to natural scientists": marginal damages of emissions

NOTE: $M_o - M^* = q^*$

... optimal public goods levels (5)



The externality is pareto irellevant

It costs to produce pub.goods

- Assume no environmental regulations
  - the observed public good level would the be what maximizes firms' expected profits
  - suppose this public good level socially sub-optimal
- Constrained / unconstrained optimization
  - why firms/consumers oppose environmental regulations
- Emissions reductions can be viewed as a public good ⇒ emissions reductions below observed levels ⇒ costs ↑ / profits ↓