

Environmental Problem?

- externalities

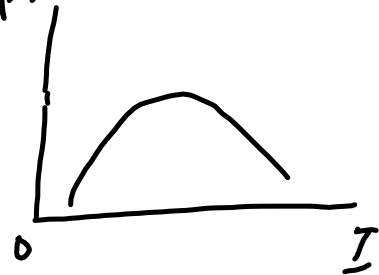
↳ air quality

Water quality

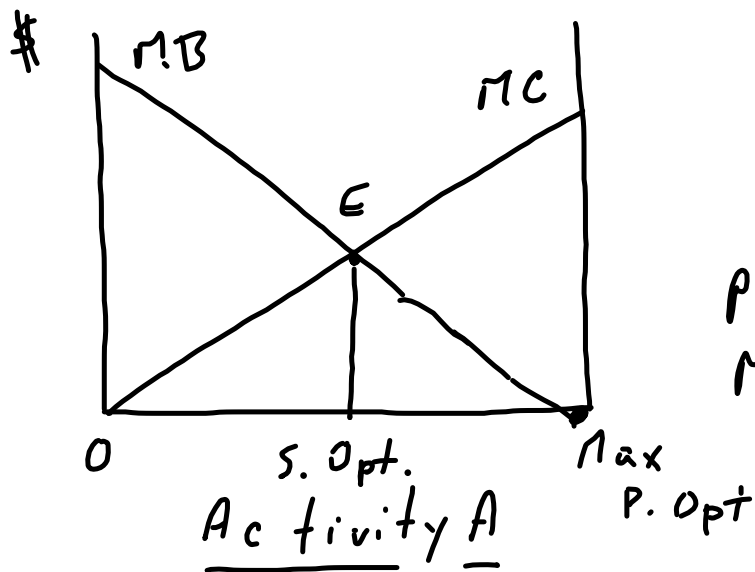
- lower than

we like p.

EKC → GDP/pop ↑  
pollution ↓



- catalog - pollutants  
values? → \$
- trade off
- health effects } EPA,  
- visibility } etc
- amenity values }
- mortality — VSL
- health effects - costs
- lost work days



$MB \rightarrow$  marginal benefit  
 $MB = 0$  private optimum  
 $MC \rightarrow$  marginal cost

- market in pollutant - necessary condition for S. Opt.

## Missing Market

- - property rights assigned
  - ↳ - transaction costs low
    - measurement
    - enforcement
- user pays

Dose-response function  
 - set standard at zero

Values

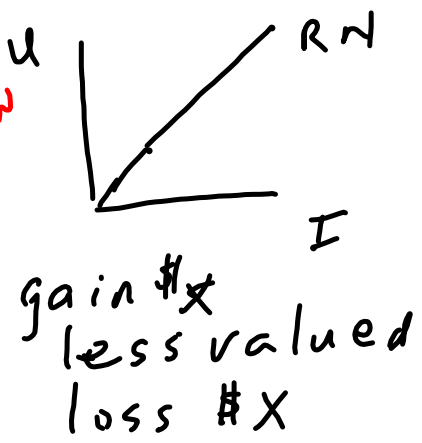
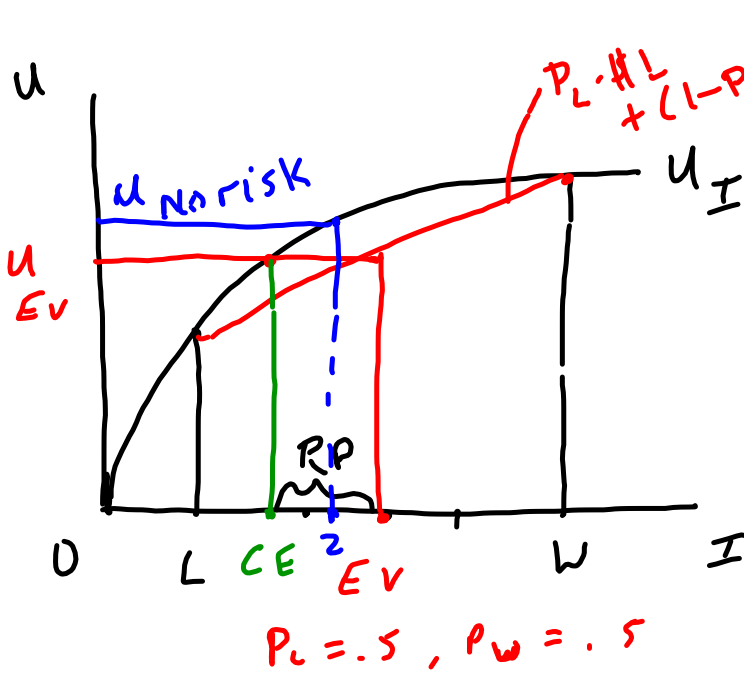
- uncertainty

$$EV = P_d \cdot D + (1 - P_d) \cdot A$$

- risk neutral  $\rightarrow$  max EV

- risk averse - some

- risk taking - others



CERTAINTY  
EQUIVALENT  
accept instead  
of gamble  
(L, W)

Risk premium  $\rightarrow RP$   
max WTP  $\rightarrow$  to pass off  
risk

Over value risk?

EV vs EU

$$\Delta \text{prob}(\text{death}) = .01 \times 100 \text{ (1.0)}$$

$$\underline{\text{VSL}} \approx \$7 \text{ mill}$$

DFE

Extreme risk aversion

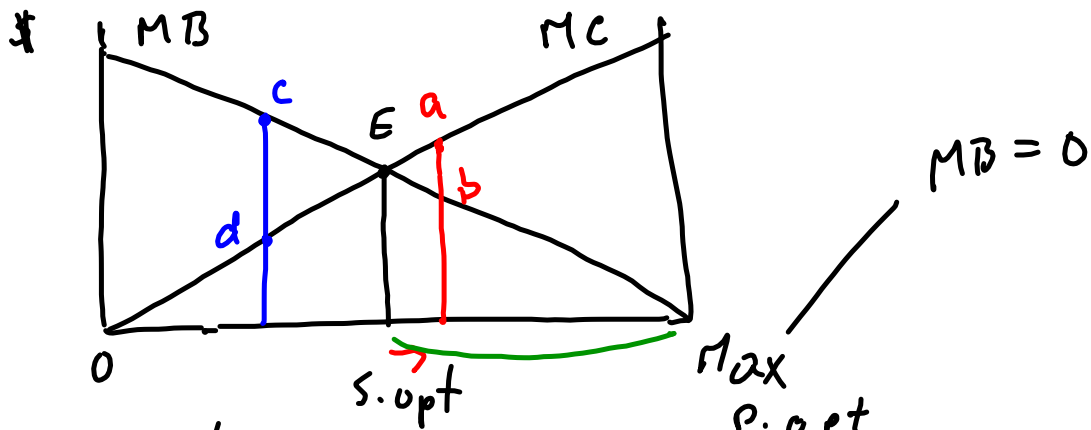
RDEU  $\rightarrow$  rank outcomes Good  $\rightarrow$  Bad  
 overweight prob of Bad

$$\downarrow \text{EV} = P_G \cdot \$G + (1 - P_G) \cdot \$\text{Bad}$$

Precautionary Principle (SMS)  
safe  
minimum  
standard

↓  
if uncertainty → look  
at worst possible  
outcome - not weighted





at P.opt

- missing market - damages (costs) not incorporated into Activity A decision

- If market created  $\rightarrow$  property right (exclude w/o payment)

$$a \text{ (comp req.)} > b \text{ (WTP)}$$

$$c > d \rightarrow \underset{c}{WTP} > \underset{d}{WTA}$$

Regulations → market outcome?