Who pays for the waste in the river?

Markets fail when costs or benefits fall on others (externalities), when nobody can be made to pay (public goods, commons) and when incomes are very unequal. Government steps in.

1 Externality

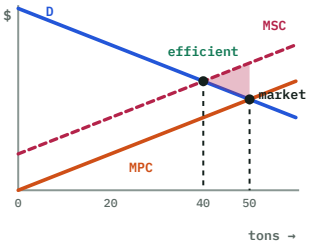
cost or benefit outside the deal

- **Market failure** = market alone gives a quantity that is not the best for society
- **Private** = what buyer or seller pays / gains (**MPC**, **MPB**; M = marginal = one more unit, C = cost, B = benefit) · **Social** = private + everyone else (**MSC**, **MSB**)
- **External cost** (smoke, waste in the river) ⇒ `MSC = MPC + harm` · **external benefit** (bees, flu shots) ⇒ `MSB = MPB + gain`
- Efficient quantity ⇒ `MSB = MSC` · market uses private curves ⇒ **wrong quantity**

2 External cost

too much, tax

- Paper mill (D = demand, Q = tons): `D = 100 − Q`, `MPC = Q`, harm $20 ⇒ `MSC = Q + 20` · market **50** t at $50 · efficient **40** t at $60
- Extra tons 41 → 50 cost society more than buyers value them ⇒ **DWL** (deadweight loss) = ½ × 10 × $20 = **$100**
- **Pigouvian tax** (Arthur Pigou, British economist, 1920) = harm per unit on every unit ⇒ MPC + tax = MSC · $20 × 40 = **$800** revenue
- Practice · steel `D = 100 − Q`, `MPC = Q + 20`, harm $20 ⇒ **40** t market, **30** t efficient, DWL **$100** · tax $30 > harm ⇒ **25** t (too few)
- Tax = harm, not more · Coase (British economist, Nobel 1991): clear ownership + cheap bargaining ⇒ deal, no tax



3 External benefit

too little, subsidy

- Beehives: `MPB = 40 − Q`, `MPC = Q`, gain $20 ⇒ `MSB = 60 − Q` · market **20** · efficient **30** · DWL **$100**
- **Subsidy** = the gain per unit ⇒ MPC – $20 meets MPB at **30** · $20 × 30 = **$600**
- Practice · flu shots `MPB = 60 − Q`, `MPC = Q + 10`, gain $20 ⇒ **25** market, **35** efficient · subsidy $20 × 35 = **$700**

4 Kinds of goods

rival? excludable?

- **Rival** = my use leaves less for you · **excludable** = can stop non-payers
- Rival + excludable ⇒ **private** (apples) · non-rival + excludable ⇒ **club** (movie theater seat) · rival + not excludable ⇒ **common resource** (open-sea fish) · non-rival + not excludable ⇒ **public** (lighthouse)
- **Free rider** = enjoys a public good without paying ⇒ lighthouse ($40 × 3 = $120 > $90 cost) raises **$0** ⇒ paid by taxes
- Practice · free road: 3 a.m. empty ⇒ **public** · 8 a.m. jammed ⇒ **common resource** (rivalry changes, payment does not)

5 Tragedy of the commons

open access

- Each boat compares **average value** with cost ⇒ ignores fish taken from others · **marginal value** = change in total catch
- Ground: average $100 … $50, cost $50 ⇒ open access **6** boats, net **$0** · owner (marginal value ≥ $50) **3** boats, net **$90**
- Practice · lake, average $80 … $40, cost $40 ⇒ open access **6** (net $0) · owner **3** (3rd adds $48; net 192 – 120 = **$72**)
- Owner uses marginal value, open access uses average ⇒ overuse

6 Inequality and taxes

Lorenz, Gini

- **Lorenz curve** (Max Lorenz, US economist, 1905) = income share held by the poorest X% · diagonal = perfect equality · further below = more unequal
- **Gini** (Corrado Gini, Italian statistician, 1912) = `2 × gap` between diagonal and curve · 0 = equal, 1 = one household has all · Town A: area under 0.30 ⇒ gap 0.20 ⇒ **0.40** · Town B (poorest fifth holds 16%) ⇒ **0.08**
- Practice · Town A after cash to the poorest (10, 25, 45, 70%) ⇒ area **0.40** ⇒ gap 0.10 ⇒ Gini **0.20**
- **Progressive** = average rate rises with income (10% → 30%) · **proportional** = same rate · **regressive** = rate falls (sales tax at the checkout: 3% vs 2%) · **transfers** = cash to households

