Negative Externalities

Exactly reverse of positive externalities:

Characteristic	Positive externality	Negative externality
Impact on third parties:	Benefit	Cost
Algebraic form:	MB _e	MC _e
Market Q:	Too small	Too large
Marginal social B or C:	$MSB = WTP + MB_e$	$MSC = WTA + MC_e$
Needed for efficiency:	MSB = WTA	WTP = MSC
Corrective policy:	$S = MB_e$	$T = MC_e$

Example:

$$WTP = 300 - Q_M^D$$
$$WTA = 2Q_M^S$$
$$MC_e = 60$$



Market equilibrium:

$$WTP = WTA$$

$$300 - Q_{M}^{D} = 2Q_{M}^{S}$$

$$300 = 3Q_{M}^{D}$$

$$Q_{M}^{D} = 100$$

$$P_{1}^{d} = WTP = 300 - 100 = $200$$

$$P_{1}^{s} = WTA = 2(100) = $200$$



Efficient equilibrium:

 $MSC = 2Q_{M}^{S} + 60$ WTP = MSC $300 - Q_{M}^{D} = 2Q_{M}^{S} + 60$ $240 = 3Q_{M}^{D}$ $Q_{M}^{D} = 80$ $P_{2}^{d} = WTP = 300 - 80 = 220$ $Q_{M}^{D} = 20$

$$P_2^s = WTA = 2(80) = 160$$



Policy needed:

- $P_2^d = P_2^s + T$
- 220 = 160 + TT = 60

Check: $T = MC_e = 60$ 🗸

Welfare impacts:

 Δ CS, Δ PS, Δ Rev calculated as usual:

$$\Delta CS = -\left(\frac{80+100}{2}\right) * (220-200) = -\$1800$$
$$\Delta PS = \left(\frac{80+100}{2}\right) * (160-200) = -\$3600$$

$$\Delta Rev = 60 * 80 = +\$4800$$

 ΔExt is the area under the MC_e curve between the old and new Q:



 $\Delta Ext = 60 * (100 - 80)$ $\Delta Ext = 60 * 20$ $\Delta Ext = 1200

Computing ΔSS :

ΔCS	-\$1800
ΔPS	-\$3600
∆Rev	+\$4800
ΔExt	+\$1200

 $\Delta SS = +\$600$

Daily exercise