

Agenda:

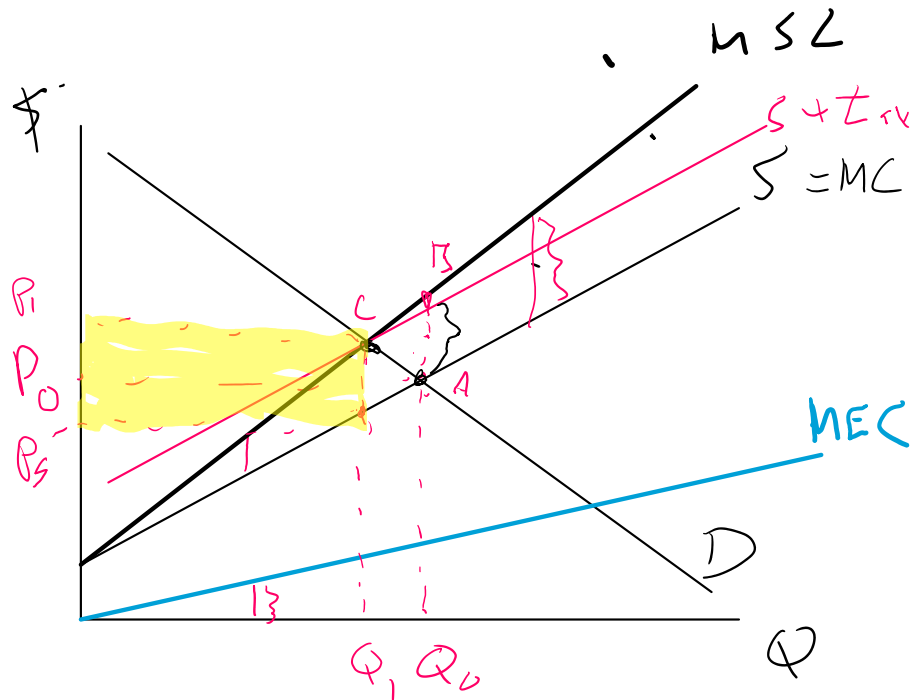
1. Pigouvian tax (or subsidy) to correct externalities
2. Tax on competitive markets: short run/long run
3. Emission tax
 - a. Equimarginal principle
 - b. Information requirements vs standards
 - c. Double dividend
 - d. Incentive to Innovate
4. Emission Subsidy

Welfare = CS + PS

Max $P = S$

$MB = MC$

MEC
Marginal external
cost



$MSC = S + MEC$

$MSC = \underbrace{MC}_{\text{private cost}} + MEC$

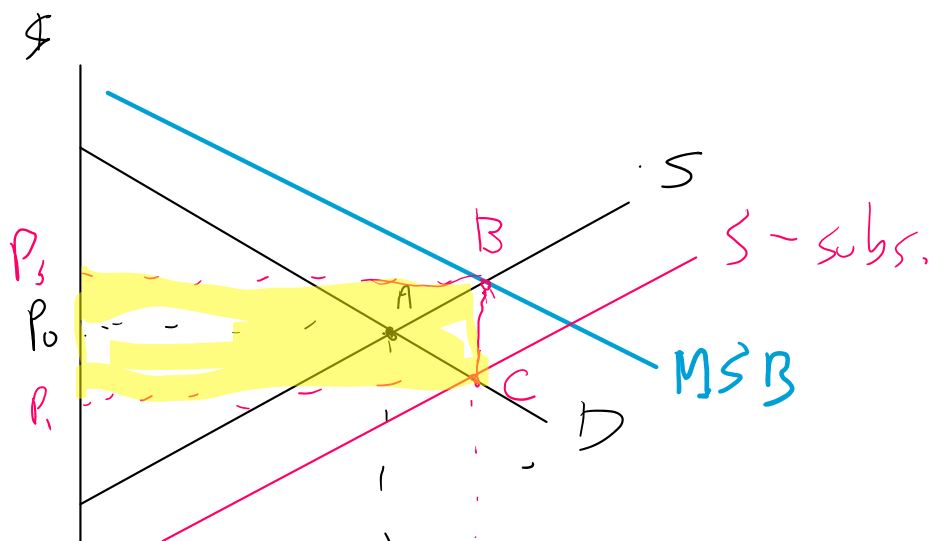
Taxes - Generate
Sour Revenue
"corrective" Tax

Pigou also looked at external benefit

MSB
marginal Social
Benefit

D + external
Benefit

Subsidy to

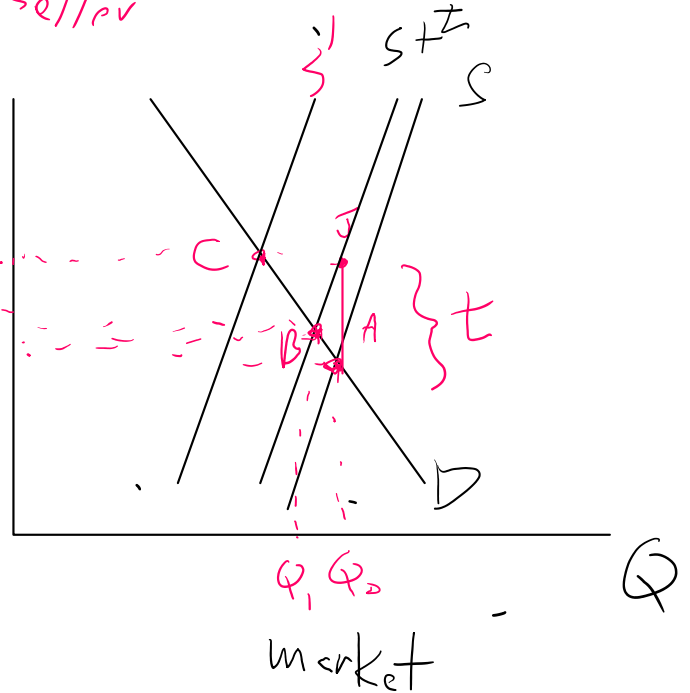
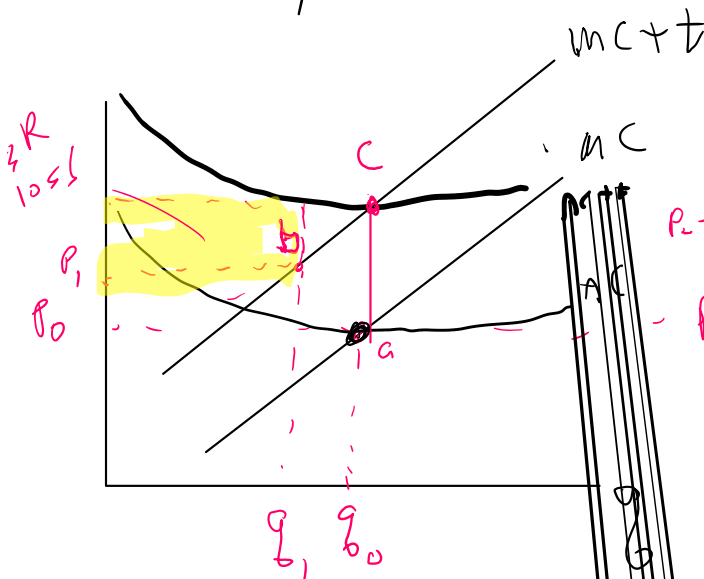
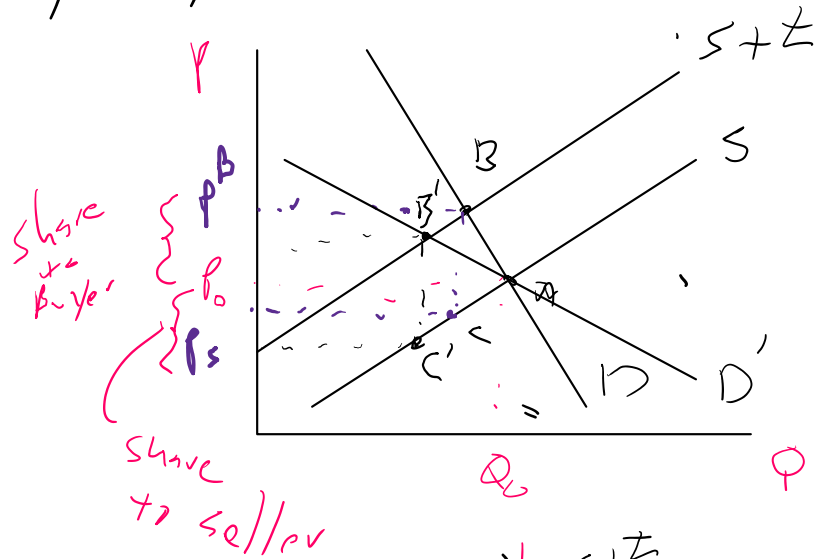


Subsidy to suppliers



Pigouvian taxes:
who actually pays?

This is only a short run analysis

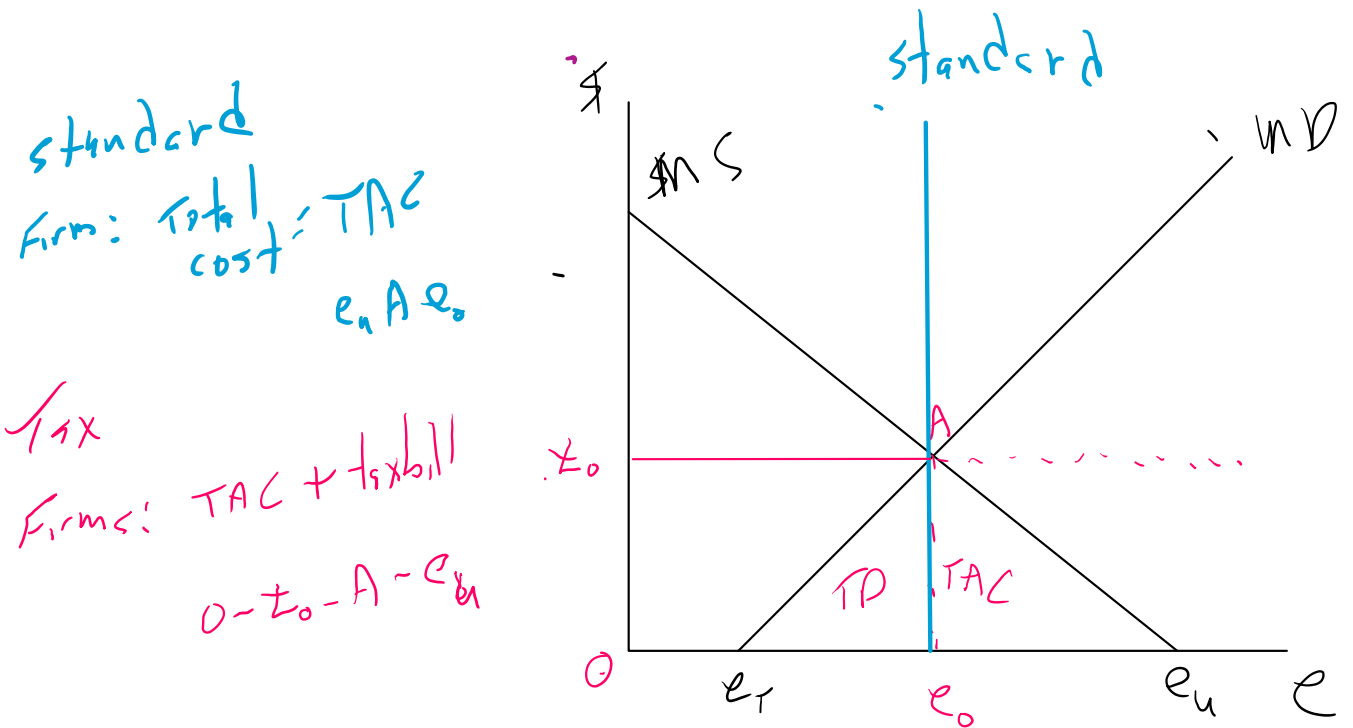
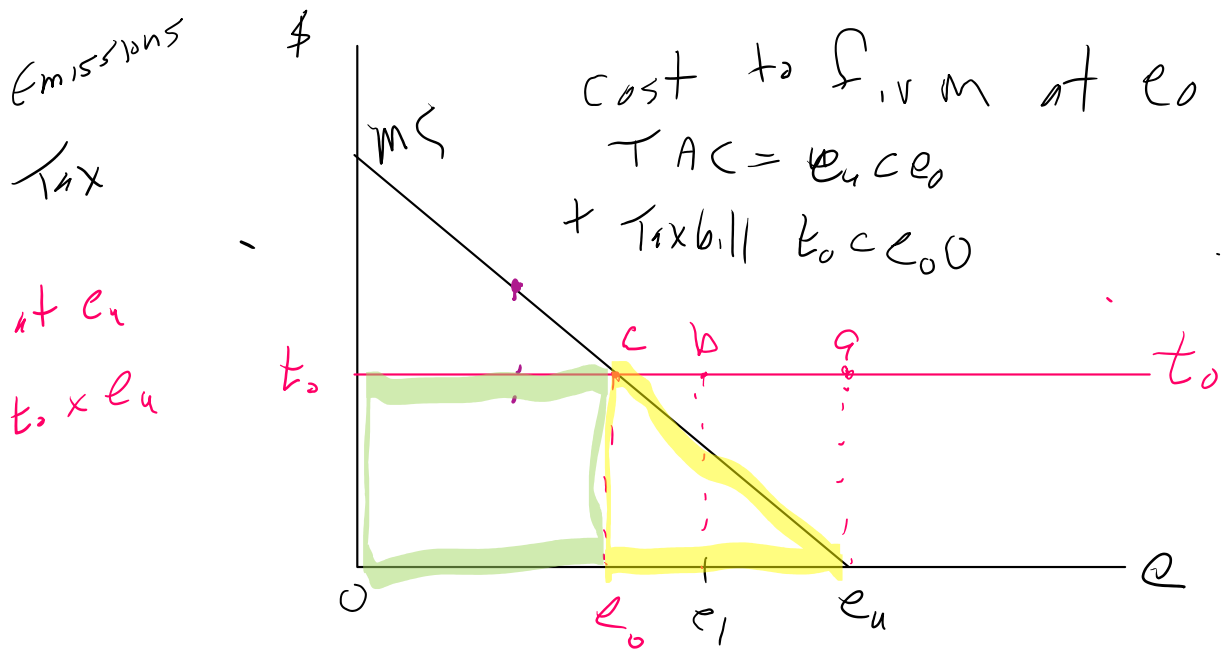


firm (n firms)
Rule $P = MC$

st A, a } LR equilibrium

$n \times q_0 = Q_0$ firms exit
 $n \times q_1 = Q_1$

Pigouvian tax \rightarrow emission fees



$TD + TAC = \text{social cost}$
 $TAC + \text{taxbill} = \text{private cost}$ (Tax Revenue does not factor in)

"Double dividend" false economy
 tax emissions
 society wins twice

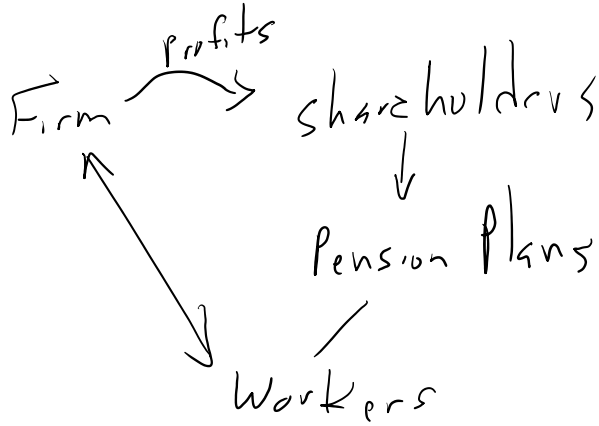


false economy

society wins twice

$\downarrow e \rightarrow \uparrow \text{taxes} \rightarrow \downarrow \text{other taxes}$

Taxbill is just a transfer (Not zero)

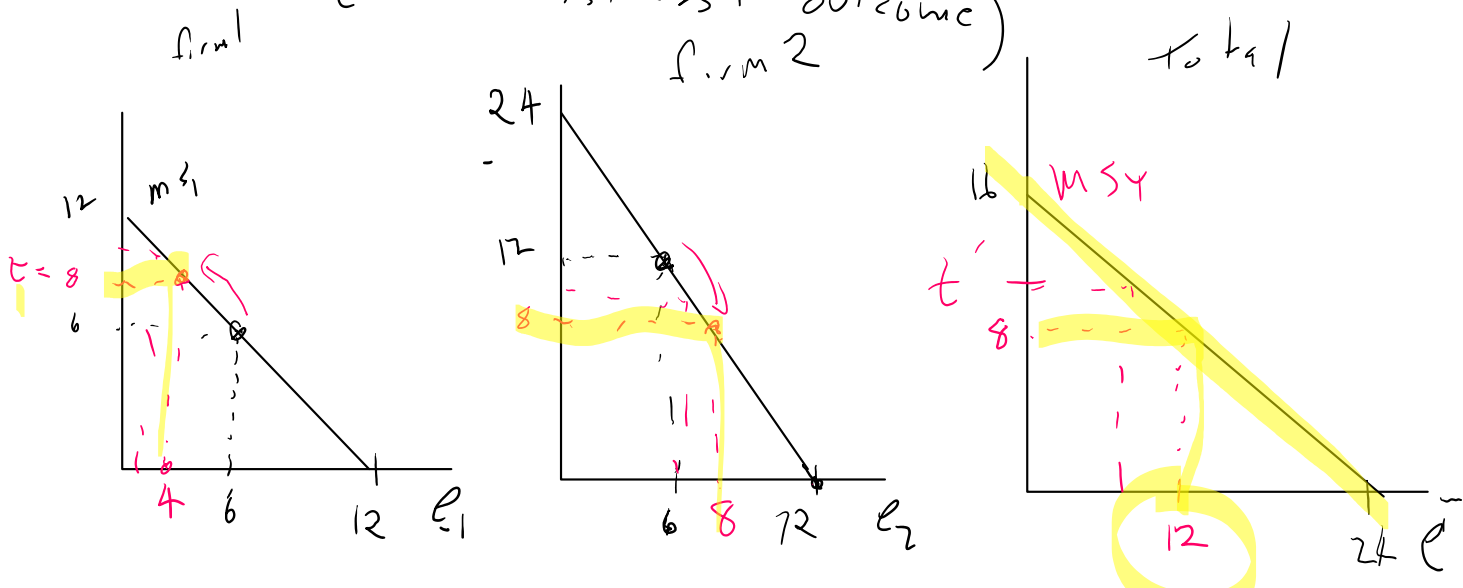


Policy Tools

- ① Emission Standard
- ② Emission tax

problem with standards

- 1) info costs high
- 2) Violate equimarginal principle (Not least cost outcome)



4 6

12 e_1

6 8 12 e_2

12

24 e

MS = 12 - MS

$$P_1 = 12 - MS$$

$$Q_1 = MS = (12 - MS) + (12 - \frac{1}{2}MS)$$

$$P_1 = 14 - \frac{3}{2}MS$$

$$MS = 16 - \frac{2}{3}P_1$$

MS = 24 - 2e₂

$$P_2 = 12 - \frac{1}{2}MS$$

tax b₁ 32

uniform standard

Goal

15

12

from 24

12

Q₁

Q₂

Q₂ = 6

$$TAC_1 = 16$$

$$TAC = 36$$

$$\text{Total } 54$$

$$T_{ox} = 8$$

$$TAC_1 = 32$$

$$TAC_2 = 16$$

$$48$$

$$\text{Firm 1 } 32 + 32 = 64$$

$$\text{Firm 2 } 16 + 64 = 80$$

Tax is more efficient but does put greater cost on the firm

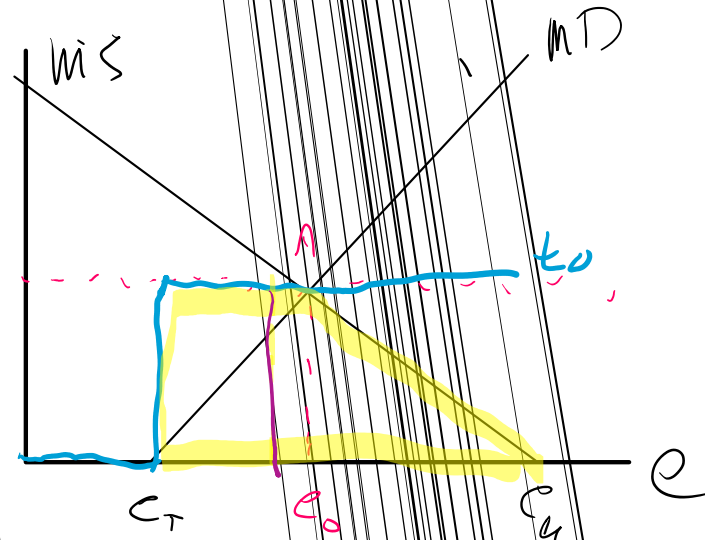
Variations of Emission tax to ↓ cost to firms

$$e \leq e_T \quad \tau > \tau_0$$

$$e > e_T \quad \tau < \tau_0$$

Incentive to innovate

total cost



MS₀

MS₁

MD

MD

if $e=0$ paid $s \cdot e_u$

$e > 0$ $s(e_u - e)$

$$\pi = p \cdot Q - c(Q) + s(e_u - e)$$

e_u - constant

$$e = Q$$

$$\pi = pQ - c(Q) + s(e_u - Q)$$

$$\pi = pQ - c(Q) + (s e_u) - sQ$$

$$\frac{d\pi}{dQ} = p - c' - s = 0$$

$$p = MC + s$$

if $s = t$