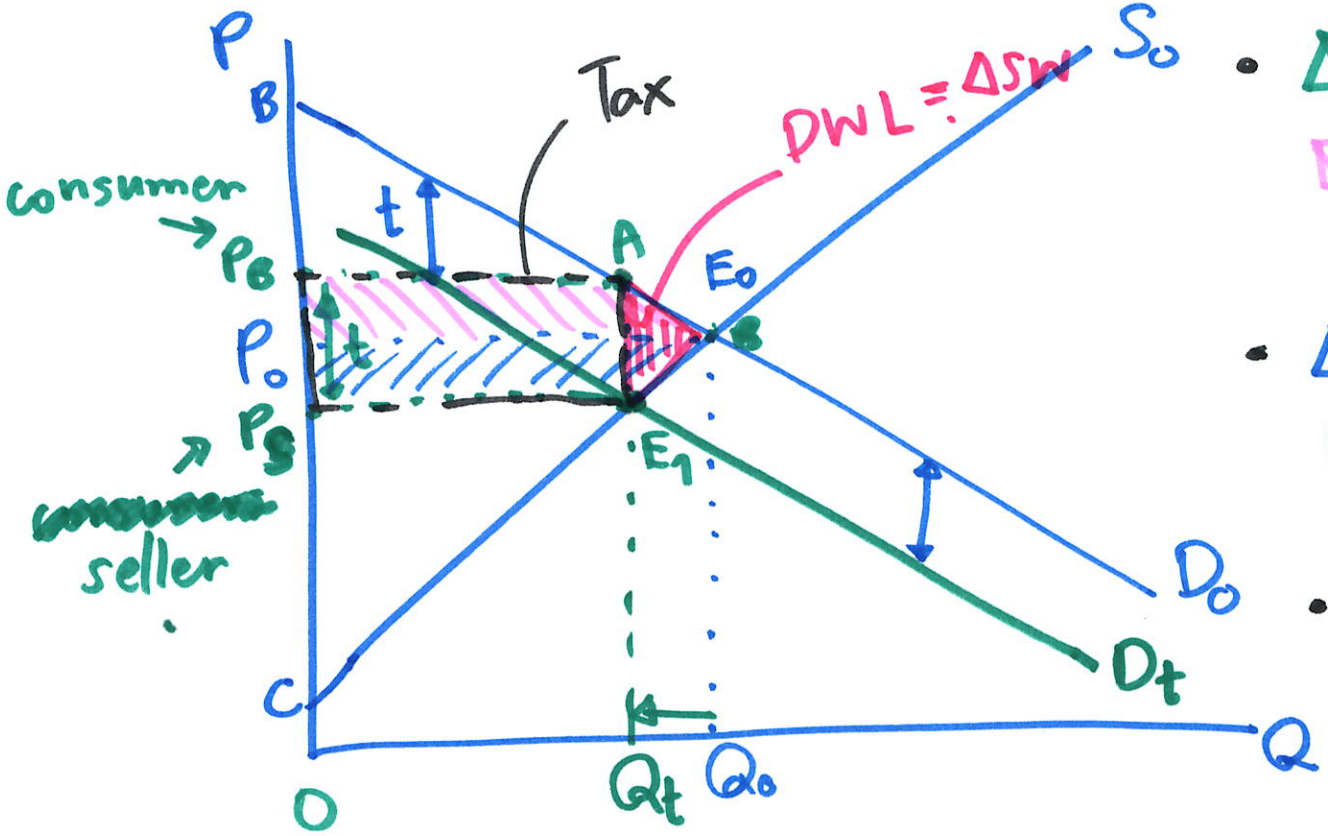
Per-unit Taxes

Sept. 24, 2020

$$P_B = P_S + t$$

① Tax imposed on Consumers → D shifts down.



- $\Delta CS = \Delta BAP_S - \Delta BE_0P_0$

  $= \text{Area } P_BAE_0P_0 < 0$

- $\Delta PS = \Delta P_SE_1C - \Delta P_0BC$

  $= \text{Area } P_0E_0E_1P_S < 0$

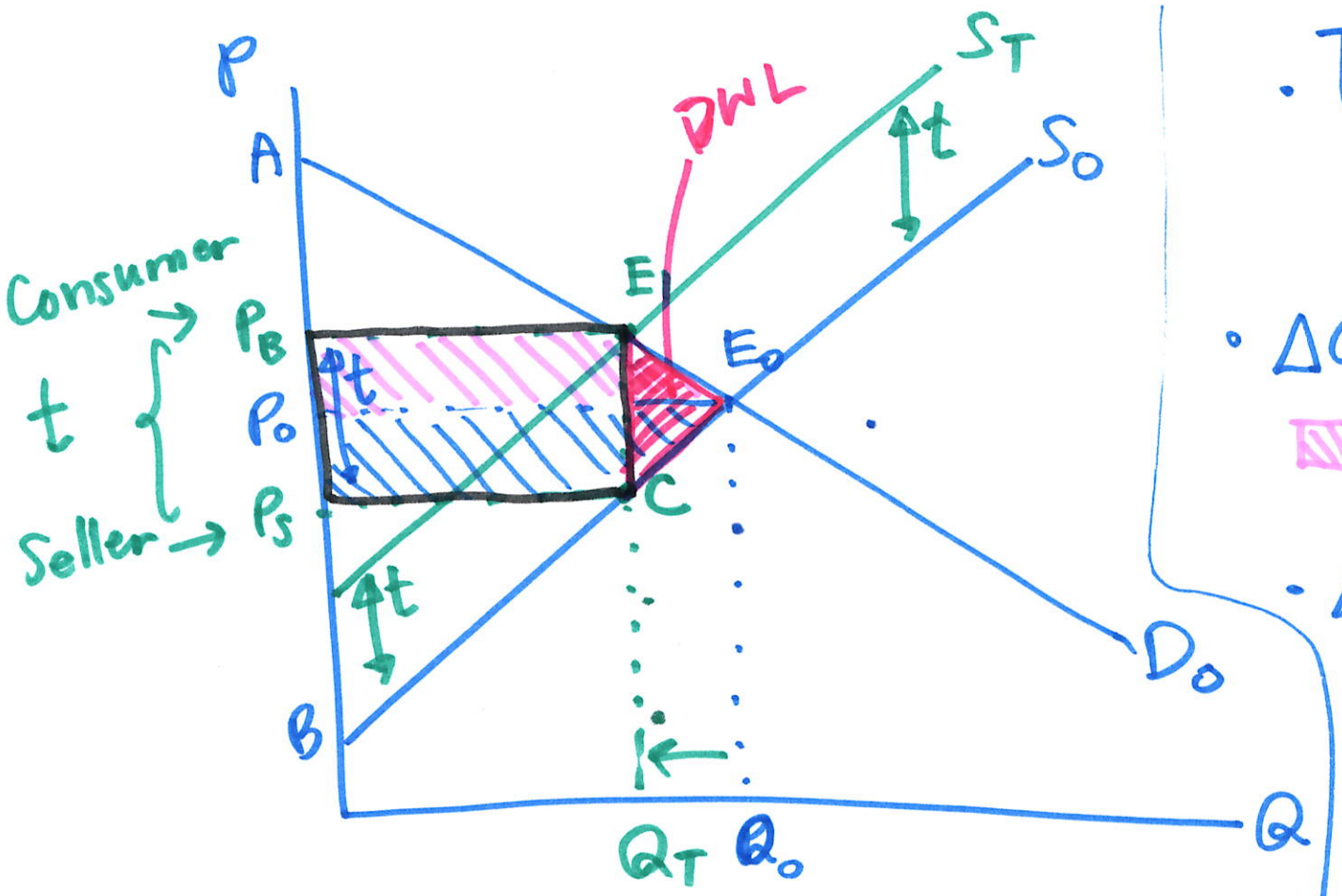
- Total tax revenue $= t \times Q_t$

  $= \square P_BAE_1P_S > 0$

$\Rightarrow \Delta SW = \Delta CS + \Delta PS + \text{tax}$

$= \Delta AE_0E_1 < 0$

② Tax imposed on Producers → S shifts up



$\Delta PS = \Delta P_S C B - \Delta P_0 E_0 B$

$= \square P_0 E_0 C P_S$

- Tax revenue $= t \times Q_T$

$= \square P_B E_1 C P_S$

- $\Delta CS = \Delta A E_1 P_B - \Delta A E_0 P_0$

$= \text{Area } P_B E_1 E_0 P_0 < 0$

- $\Delta PS = -\Delta P_0 E_0 B + \Delta P_S C B$

(old PS, New PS)

$= -\text{Area } P_0 E_0 C P_S < 0$

$\Rightarrow \Delta SW = \Delta CS + \Delta PS + tax$

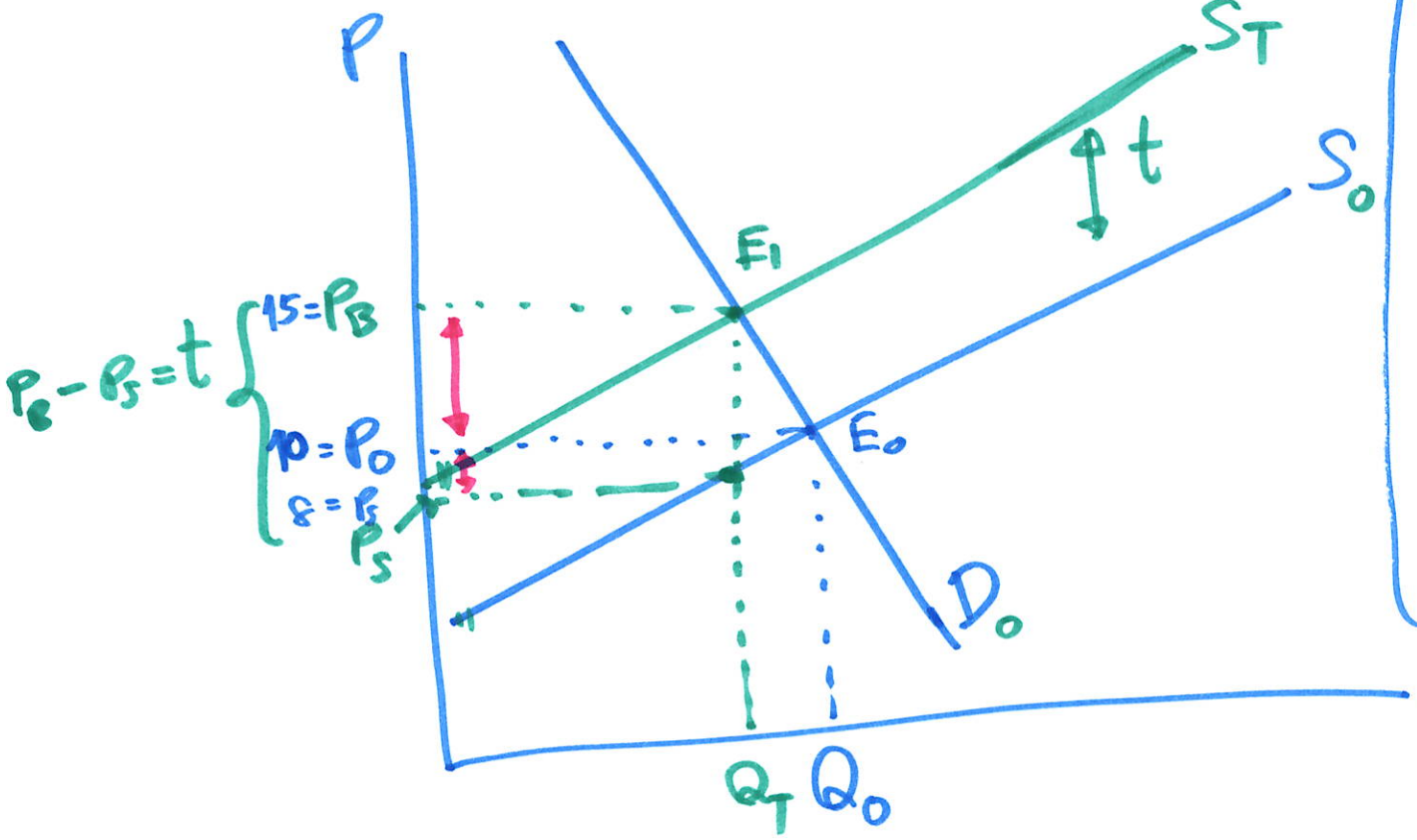
$(-) \quad (-) \quad (+)$

$= \Delta E_1 E_0 C < 0$

$= DWL$

Tax incidence : Who bears the burden from tax.

1) Supply is more price-elastic than demand.



→ Consumer bears more tax burden.

Assume tax is imposed on producers.

$t \rightarrow P_B - P_0$

$P_0 - P_S$

Let $P_B = 15$, $P_0 = 10$,

$P_S = 8$

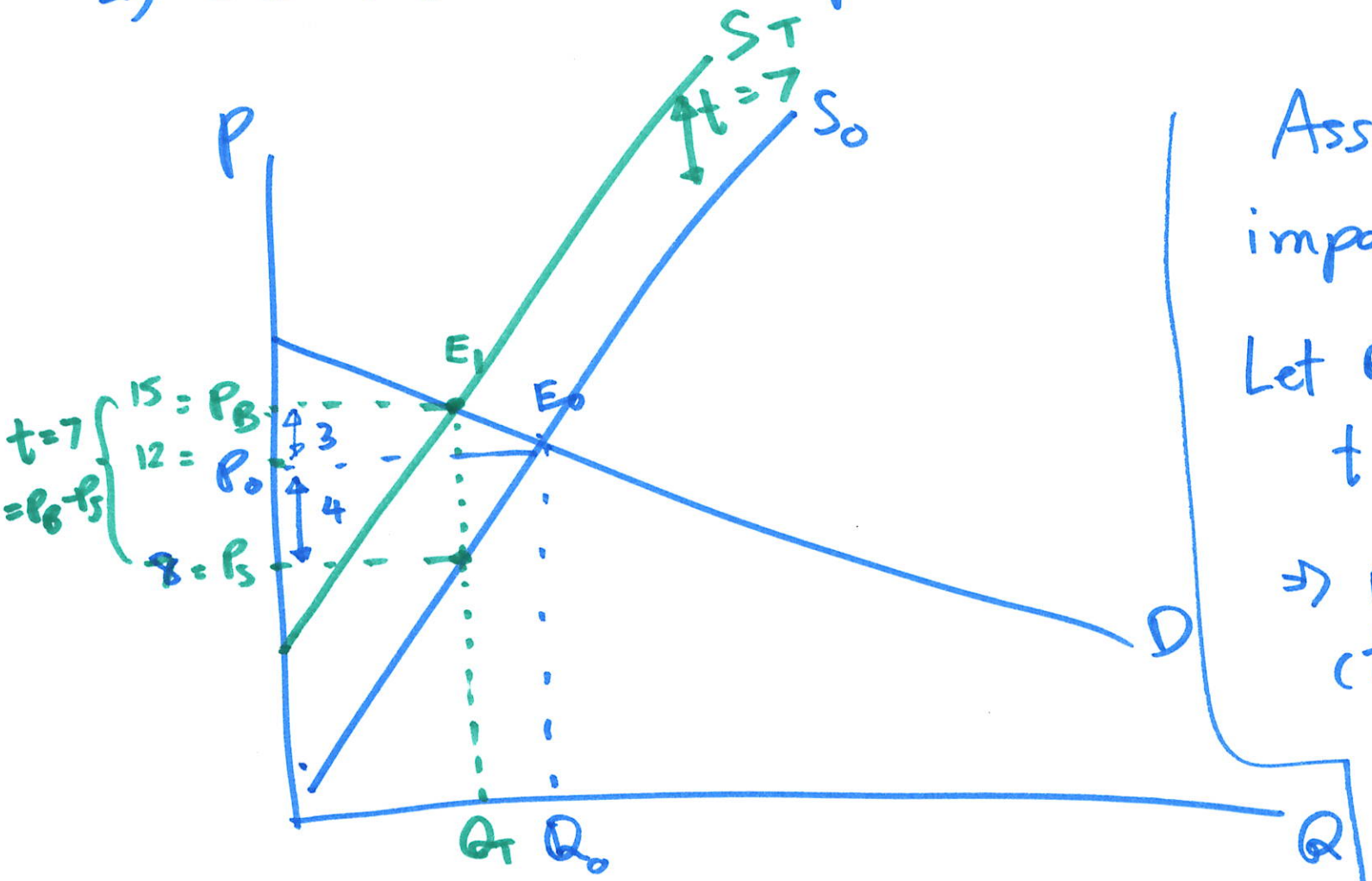
$t = P_B - P_S = \$7$

Consumer pays = \$5

Producer pays = \$2.

Tax incidence

2) Demand is more price-elastic than supply.



$7 per unit

Assume tax is imposed on producers.

Let $P_B = 15$, $P_S = 8$, $P_0 = 12$

$t = 15 - 8 = \$7$.

$\Rightarrow P_B - P_0 = 3$
(tax burden for consumers).

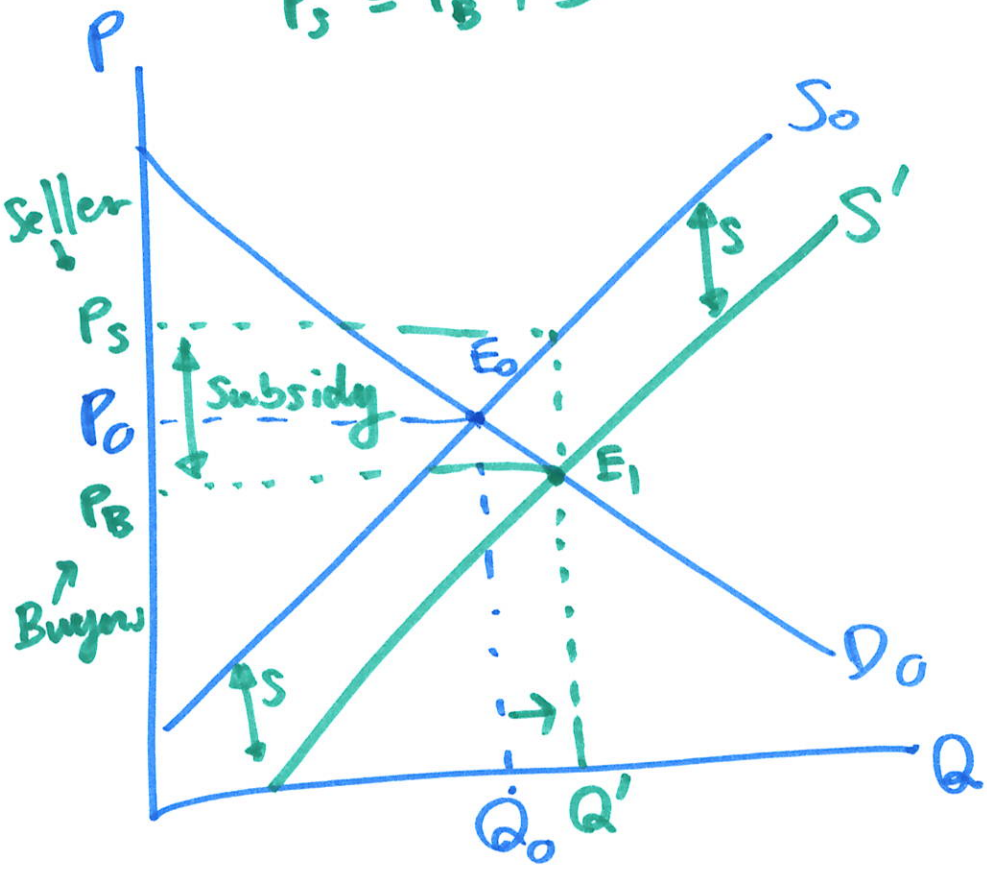
$\Rightarrow P_0 - P_S = 12 - 8 = 4$
(tax burden for producers).

$\Rightarrow$ Producer bears more tax burden.
↳ b/c producers are INsensitive to price change.

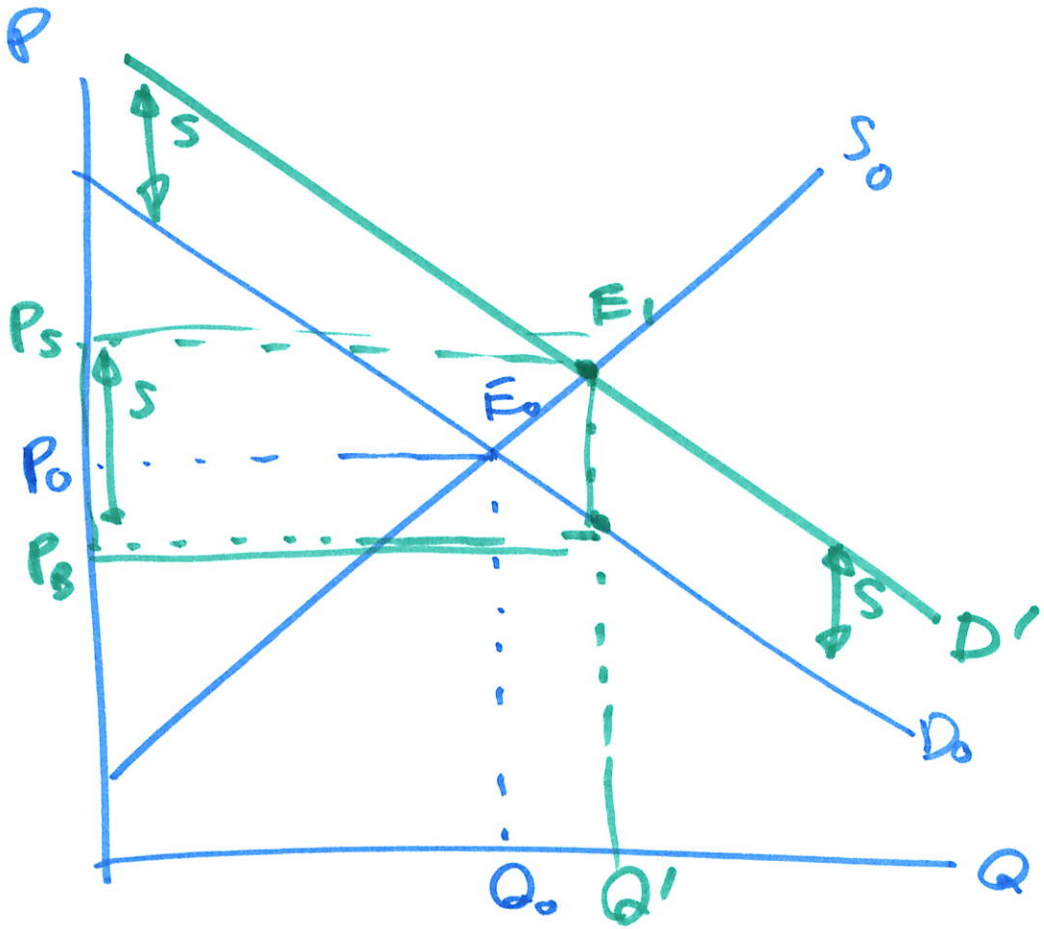
Subsidy (per unit) $s = -t$

1) Subsidy on producers

$P_S = P_B + S$

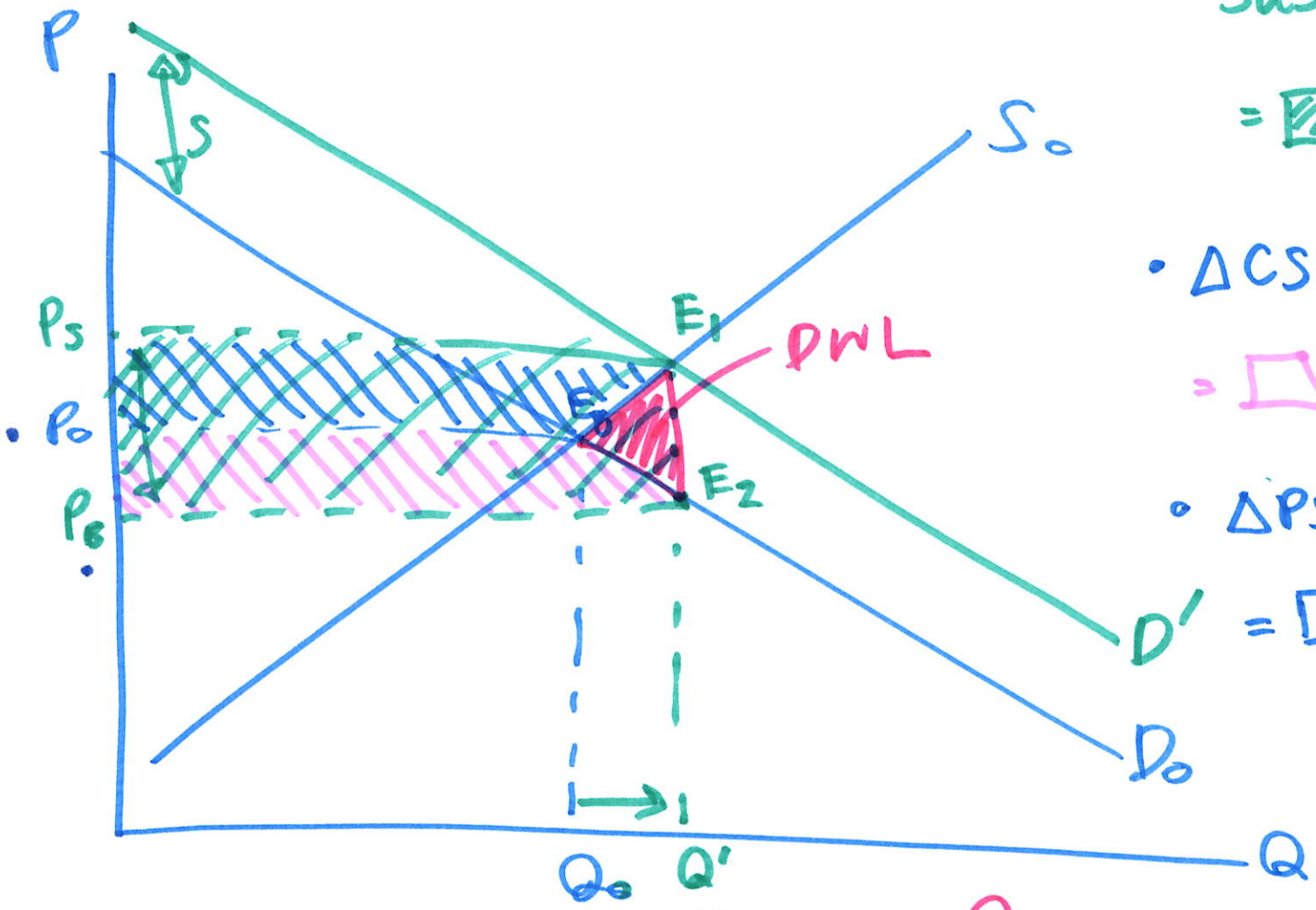


2) Subsidy on consumers



Amount of subsidy = $(P_S - P_B) \times Q'$

(b)



- Subsidy
  $= \square P_S E_1 E_2 P_B < 0$
- $\Delta CS > 0$
  $= \square P_0 E_0 E_2 P_B$
- $\Delta PS > 0$
  $= \square P_S E_1 E_0 P_B$

$$\Rightarrow \Delta SW = \overset{(+)}{\Delta CS} + \overset{(+)}{\Delta PS} + \overset{(-)}{\text{Subsidy}}$$

$$= \Delta E_0 E_1 E_2$$