

①

Demand: $P = 50 - 0.2Q_d \rightarrow Q_d = 250 - 5P$

Supply: $P = 20 + 0.1Q_s \rightarrow Q_s = -200 + 10P$

Before tax

At eqm, $Q_d = Q_s = Q_E^*$

$250 - 5P = -200 + 10P$

$450 = 15P$

$P_E^* = 30$

Sub in D: $Q_d^* = Q_s^* = 250 - 5(30)$

$Q_E^* = 100$ units

Per-unit tax burden for buyers = \$4
sellers = \$2

After tax (\$6 per unit imposed on consumers)

New demand: $Q_d^T = 250 - 5(P+6)$
where $P = P_s$

At eqm, $Q_d^T = Q_s$

$250 - 5(P+6) = -200 + 10P$

$250 - 5P - 30 = -200 + 10P$

$420 = 15P$

$P_s^T = 28$

$P_p^T = 28 + 6 = 34$

$Q_d^T = -200 + 10(28) = 80$ units

(34-30)

(30-28)

② \therefore Total tax burden for buyers = $\$(34 - 30) \times 80 = \320

... sellers = $\$(30 - 28) \times 80 = \160

Total tax = \$480

Elasticities. D: $P = 50 - 0.2Q_d$

$Q_d = 250 - 5P$

S: $P = 20 + 0.1Q_s$

$Q_s = -200 + 10P$

at $(Q_E^*, P_E^*) = (100, 30)$

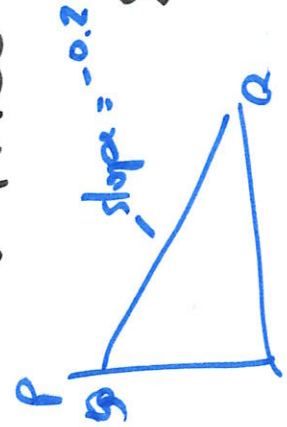
• Price elasticity of demand:

$\epsilon_d = \frac{\% \Delta Q_d}{\% \Delta P}$

slope

$\epsilon_d = \frac{\Delta Q_d / Q_d}{\Delta P / P} = \frac{\Delta Q_d}{\Delta P} \times \frac{P}{Q_d} = (-5) \times \frac{30}{100} = -1.5$

$|\epsilon_d|$

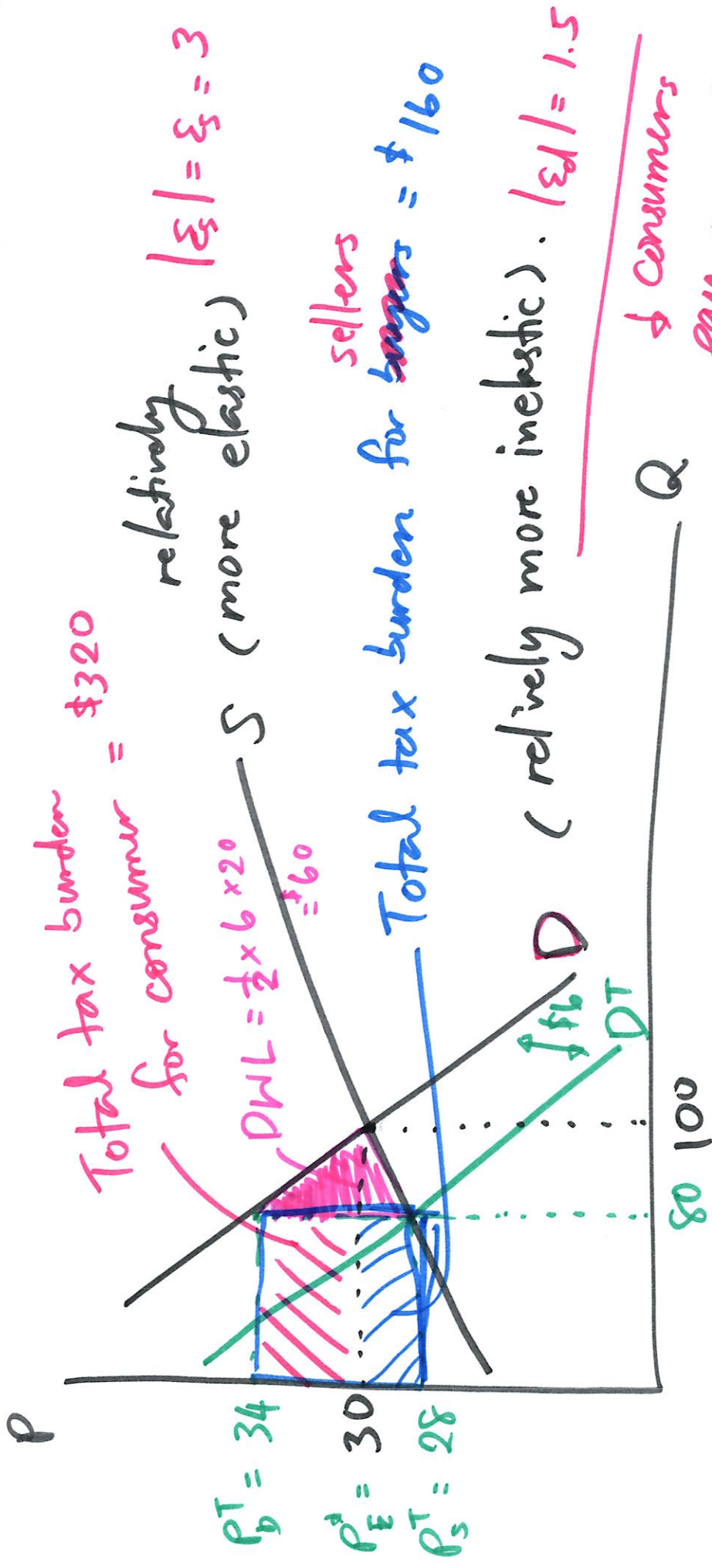


• Price elasticity of supply:

$\epsilon_s = \frac{\% \Delta Q_s}{\% \Delta P}$

$\epsilon_s = \frac{\Delta Q_s / Q_s}{\Delta P / P} = \frac{\Delta Q_s}{\Delta P} \times \frac{P}{Q_s} = (10) \times \frac{30}{10} = 3$

3



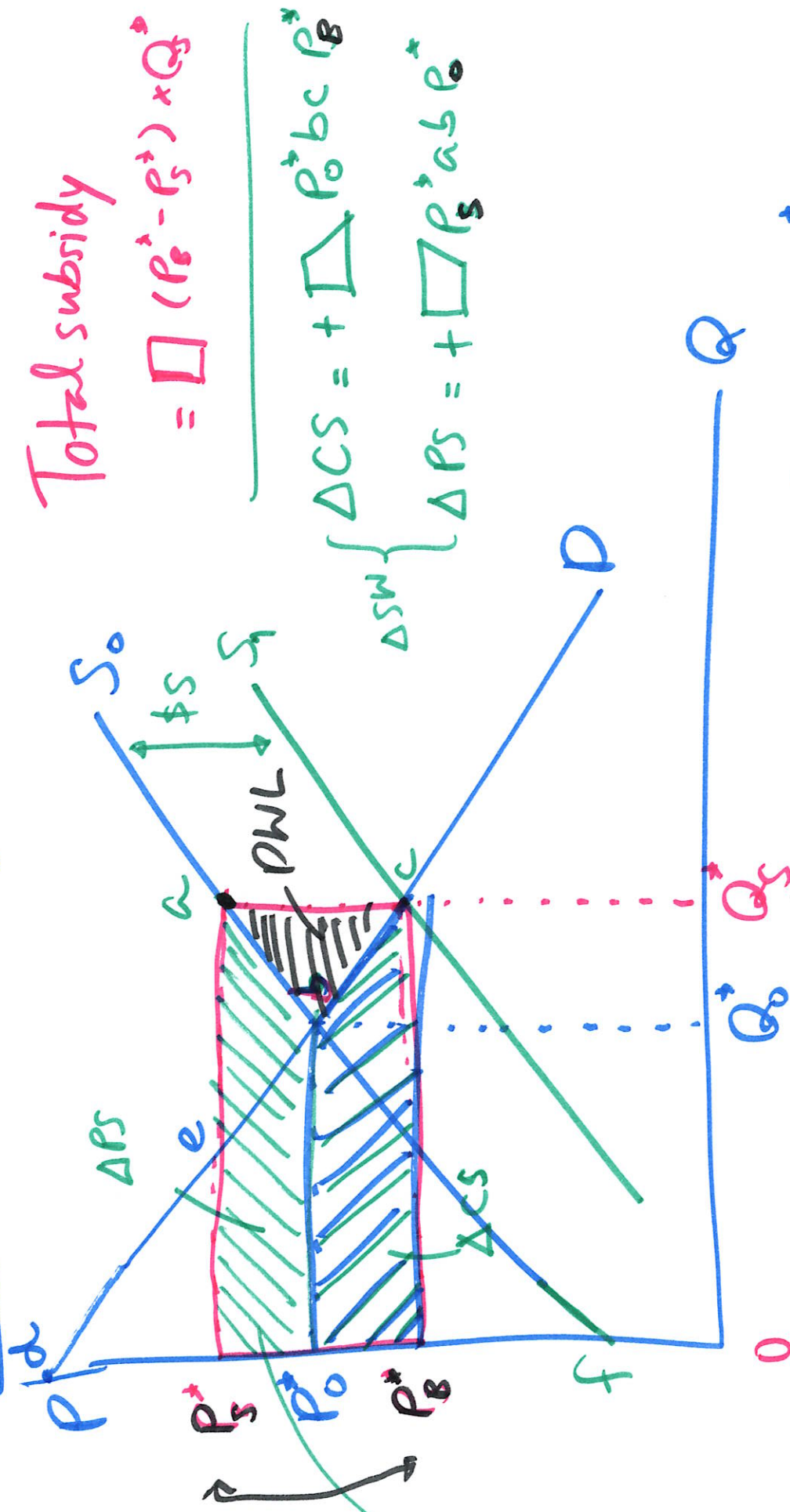
Total welfare loss = $\Delta CS + \Delta PS$

= total tax revenue + DWL
 tax paid by consumers

④

$$s = -t$$

Subsidy (on producer)



Total subsidy

$$= \square (P_1^* - P_0^*) \times Q_1^*$$

$$\Delta CS = + \square P_0^* bc P_1^*$$

$$\Delta PS = + \square P_1^* ab P_0^*$$

ΔSW

$$\Delta CS = CS_{New} - CS_{old} = \Delta dcP_1^* - \Delta dbP_0^*$$

$$= \Delta \square P_1^* bc P_0^*$$

$$\Delta PS = \Delta P_1^* af - \Delta P_0^* bf$$

$$= \square$$