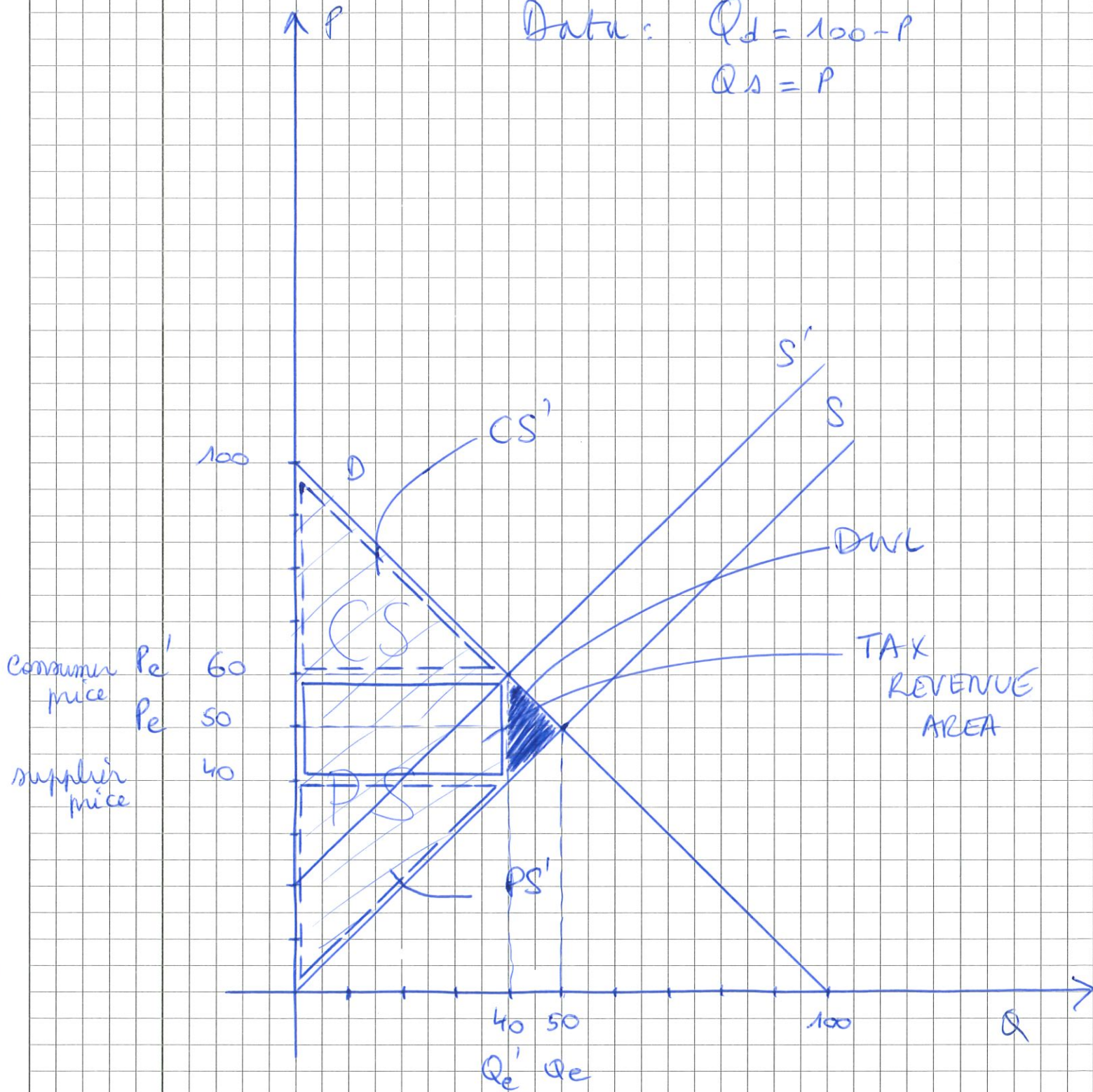


Data:  $Q_d = 100 - P$   
 $Q_s = P$



- ① Draw D and S model
- ② Draw market equilibrium  $(P_e, Q_e)$
- ③ Calculate market equilibrium  $(P_e, Q_e)$

$$Q_d = Q_s$$

$$100 - P = P$$

$$100 = 2P$$

$$P_e = €50$$

$$Q_e = 50$$

- ④ Draw CS, PS and TW 

- ⑤ Write-down formulas CS, PS and TW

$$CS = \frac{[(P_{Q_d=0} - P_e) \cdot Q_e]}{2}$$

$$PS = \frac{[(P_e - P_{Q_s=0}) \cdot Q_e]}{2}$$

$$TW = CS + PS$$

⑥ Calculate CS, PS and TW

$$CS = \frac{[(100 - 50) \cdot 50]}{2} = € 1250$$

$$PS = \frac{[(50 - 0) \cdot 50]}{2} = € 1250$$

$$TW = € 2500$$

Imagine government sets a tax of € 20  
(per unit)

⑦ Which curve is impacted?

S-curve

⑧ What is the impact? Why?

S-curve shifts to the left (parallel)

Tax = cost increase for supplier

⇓

S ↓

⑨ What is  $Q_s'$ ?

$$Q_s' = P - 20$$

3

- ⑩ Draw new supply curve  $S'$
- ⑪ Draw new market equilibrium  $(P_e', Q_e')$
- ⑫ Calculate new market equilibrium  $(P_e', Q_e')$

$$Q_d = Q_{S'}$$

$$100 - P = P - 20$$

$$120 = 2P$$

$$P_e' = \text{€}60$$

$$Q_e' = 40$$

including new  $P_{\text{consumer}}$  and  $P_{\text{supplier}}$

- ⑬ Draw new CS, PS and TW  
↓  
 $CS', PS', TW'$



- ⑭ Write-down formulas  $CS', PS'$  and  $TW'$

$$CS' = \frac{[(P_{Q_0=0} - P_e') \cdot Q_e']}{2}$$

↓

$P_{\text{consumer}}$   
€60

$$PS' = \frac{[(P_{\text{supplier}} - P_{Q_s=0}) \cdot Q_e']}{2}$$

$$TW' = CS' + PS'$$

15 Calculate  $CS'$ ,  $PS'$  and  $TW'$

$$CS' = \frac{[(100 - 60) \cdot 40]}{2} = € 800$$

$$PS' = \frac{[(40 - 0) \cdot 40]}{2} = € 800$$

$$TW' = € 1600$$

16 Draw tax revenue area



TRA

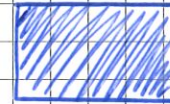
17 Calculate tax revenue area

$$\text{Tax} \cdot Q_e' = € 800$$



18

Draw DWL



19

Calculate DWL

$$\begin{array}{r}
 DWL = TR' \\
 - TW \\
 + TRA \\
 \hline
 \text{€ } 1600 \\
 \text{€ } 2500 \\
 \text{€ } 800 \\
 \hline
 \text{€ } -100
 \end{array}$$



Extra: What is the impact of the tax?

€ 20 → 50% paid by consumer  
 (p<sub>e</sub> → p<sub>e</sub>' = +€ 10)  
 → 50% paid by supplier  
 = € 10

Conclusion: Pigouvian tax "internalizes" external cost.  
 Social price is higher.

6

But the government measures generates a loss of market wealth.