Industrial Organisation / Assignment 1.

(1)

$Q_S = 400p - 100$

$Q_D = 1100 - 200p$

Compute the equilibrium price:

$$Q_S = Q_D$$

$400p - 100 = 1100 - 200p \quad | +200p$

$600p - 100 = 1100 \quad | +100$

$600p = 1200$

$p = 2$ Equilibrium price = 2

Equilibrium Quantity:

$Q_S = 400(2) - 100$

$Q_S = 800 - 100$

$Q_S = 700$

$Qd = 1100 - 200(2)$

$Qd = 1100 - 400$

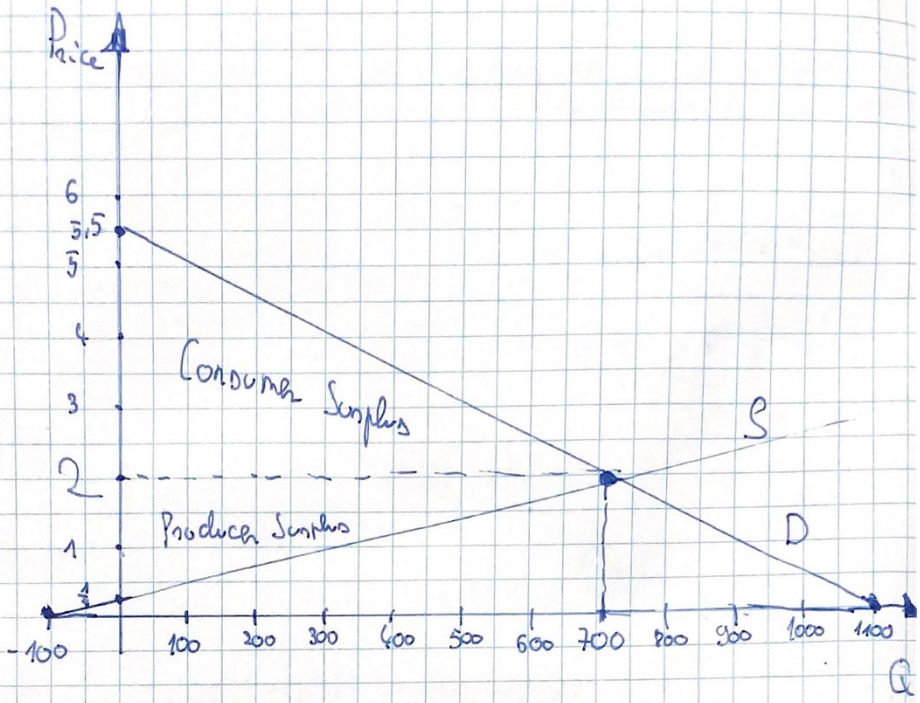
$Qd = 700.$

Equilibrium Quantity is 700

Surplus

$Q_S = 400p - 100$

$Q_D = 1100 - 200p$



Points for the graph:

points for D:

- D/S at P = 0: $Q_D = 1100 - 200 \cdot 0$, $Q_D = 1100$
- D/S at Q = 0: $0 = 1100 - 200p$, $200p = 1100$, $p = 5,5$

Points for S:

- $Q_S = 400(0) - 100$, $Q_S = -100$
- $0 = 400p - 100$, $100 = 400p$, $p = \frac{1}{4} = 0,25$

Consumer Surplus

$$CS = \frac{1}{2} \cdot B \cdot H \Rightarrow \frac{1}{2} \cdot 700 \cdot 3,5 = \underline{1225}$$

Producer Surplus

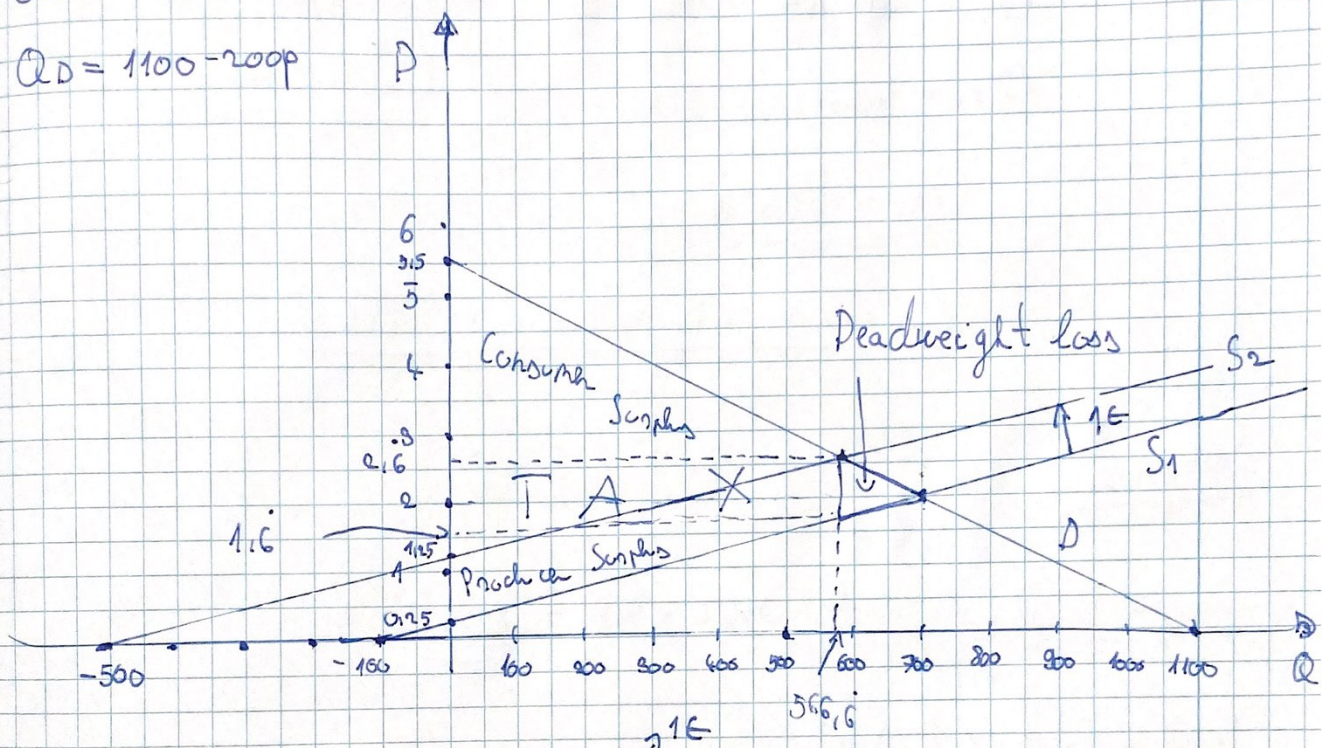
$$PS = \frac{1}{2} \cdot B \cdot H \Rightarrow \frac{1}{2} \cdot 700 \cdot 1,75 = \underline{612,5}$$

Producers are taxed

③ Supply is taxed

$Q_S = 400p - 100$

$Q_D = 1100 - 200p$



↑ 1€

If we impose a tax: $Q_{S_2} = 400(p - tax) - 100 = 400p - 400 - 100 = 400p - 500$

Note: Q_{S_1} → non-taxed

Q_{S_2} → taxed $\quad Q_{S_2} = 400p - 500$

Points for our new supply line:

S at p = 0

$Q_{S_2} = 400 \cdot (0) - 500$

$Q_{S_2} = -500$

Sat Q = 0

$0 = 400p - 500$

$500 = 400p$

$p = 1,25$

Price ↑

The new Equilibrium: $Q_{S_2} = Q_d$

$400p - 500 = 1100 - 200p$

$600p - 500 = 1100$

$600p = 1600$

$p = 2,66$

The new Quantity Equilibrium:

$Q_{s2} = 400p - 500$

$Q_{s2} = 400(2.\dot{6}) - 500$

$Q_{s2} = 566,\dot{6}$

$Q_d = 1100 - 200(2.\dot{6})$

$Q_d = 566,\dot{6}$

The new quantity equilibrium is $566.\dot{6}$

Surplus

$\frac{1}{2} \cdot B \cdot H$

$5,5 - 2.\dot{6}$

Consumer Surplus: $\frac{1}{2} \cdot 566.\dot{6} \cdot 2,8\dot{3} = 802,\dot{7}$

Producer Surplus: $\frac{1}{2} \cdot B \cdot H$

we don't know the height of the Producer triangle

So we need to find that by replacing the Q with $566.\dot{6}$ in the Q_{s1} equation

$566.\dot{6} = 400p - 100$

$666.\ddot{6} = 400p$

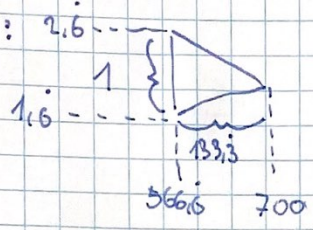
$p = 1,\dot{6}$

$1,\dot{6} - 0,25 = 1,41\dot{6}$ is the height of the producer triangle

$\Rightarrow \frac{1}{2} \cdot 1,41\dot{6} \cdot 566.\dot{6} = 401,3\dot{8}$

Tax is $\left(2,\dot{6} - 1,\dot{6}\right) \cdot 566,\dot{6} = \underline{\underline{566,\dot{6}}}$

Deadweight loss:



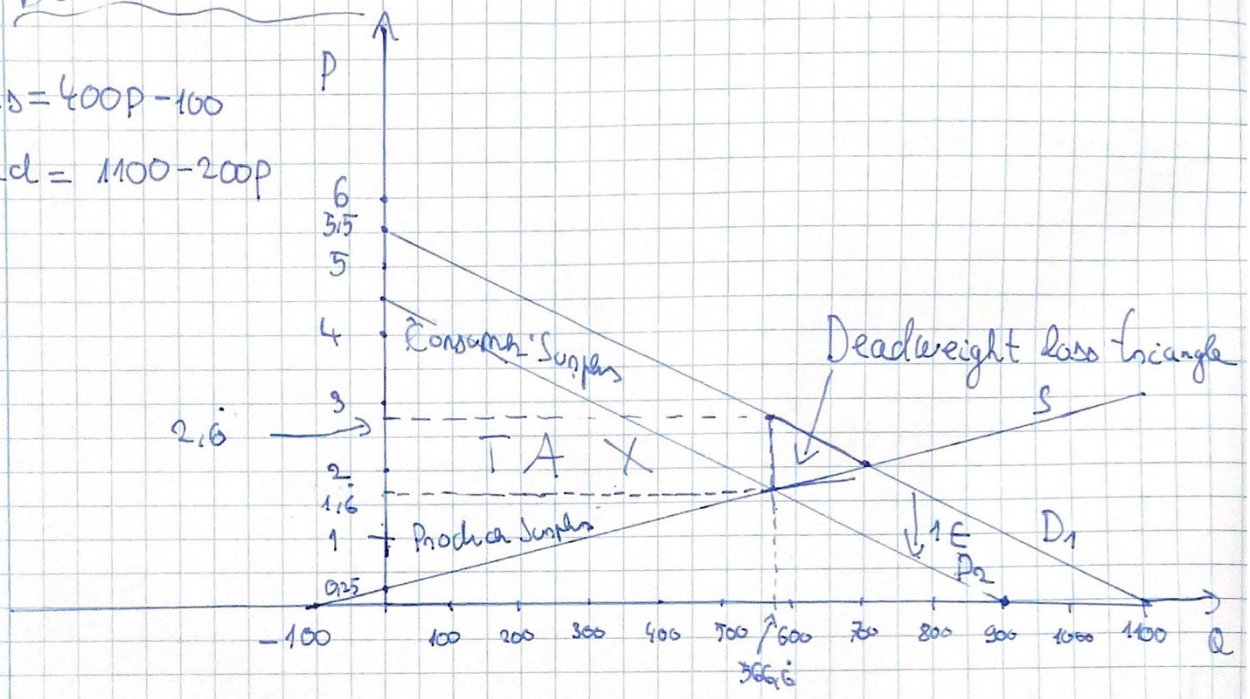
$$\frac{1}{2} \cdot B \cdot H = \frac{1}{2} \cdot 133,\dot{3} \cdot 1 = \underline{\underline{66,\dot{6}}}$$

② Demand is taxed

Consumers are taxed

$Q_s = 400p - 100$

$Q_d = 1100 - 200p$



If we impose a tax on the D

Note: Q_{D_1} → non taxed

Q_{D_2} → taxed

$$Q_{D_2} = 1100 - 200(p - \underbrace{tax}_{1€})$$

$$= 1100 - 200p - 200$$

$$= 900 - 200p$$

Points for our new demand line:

At $p = 0$

$Q_{D_2} = 900 - 200(0)$

$Q_{D_2} = 900$

At $Q = 0$

$0 = 900 - 200p$

$200p = 900$

$p = 4,5$

Price ↑

The new Equilibrium: $Q_{S_1} = Q_{d_2}$

$400p - 100 = 900 - 200p$

$400p = 1000 - 200p$

$600p = 1000$

$p = 1,6$

The new quantity Equilibrium:

$$Q_{D_2} = 900 - 200(1.\dot{6})$$

$$= 900 - 333.\dot{3}$$

$$= \underline{566.\dot{6}}$$

Surplus:

Consumer Surplus: $\frac{1}{2} \cdot B \cdot H$

we don't know the height of the consumer surplus triangle So we calculate it by inserting $566.\dot{6}$ into the Q_{D_1} equation

$$Q_{D_1} = 1100 - 200p$$

$$566.\dot{6} = 1100 - 200p$$

$$200p = 1100 - 566.\dot{6}$$

$$\underline{p = 2.66}$$

$$\Rightarrow 5.\bar{5} - 2.\dot{6}$$

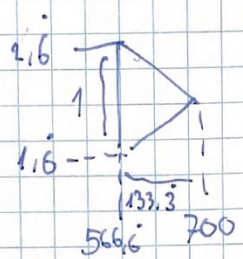
$$\Rightarrow \frac{1}{2} \cdot 566.\dot{6} \cdot 2.8\dot{3} = \underline{802.7}$$

Producer Surplus $\rightarrow 1.\dot{6} - 0.25$

$$\Rightarrow \frac{1}{2} \cdot 1.41\dot{6} \cdot 566.\dot{6} = \underline{401.3\dot{8}}$$

Tax is $\Rightarrow (2.\dot{6} - 1.\dot{6}) \cdot 566.\dot{6} = \underline{566.\dot{6}}$

Deadweight loss:



$$\Rightarrow \frac{1}{2} \cdot 133{,}\dot{3} \cdot 1 = \underline{\underline{66{,}\dot{6}}}$$

Conclusion: It doesn't matter whom the government collected that 1€ tax because in both cases, they will pay the same amount of taxes as they did when the other party was taxed.
As we saw; when we taxed the consumers their surplus was 800/7 and their surplus stayed the same when the producers were taxed. We experienced the same pattern when the producers were taxed. Their surplus was the same when they were taxed and when the consumers were taxed.