Case 1: Business as Usual

Set the tax:

$$T = 0$$

Find P^d and P^s:

$$Q_M^D = Q_M^S$$

$$\frac{2000 - \boldsymbol{P^d}}{5} = \frac{P^s}{15}$$

$$\boldsymbol{P^d = P^s + 0}$$

$$\frac{2000 - (\boldsymbol{P^s + 0})}{5} = \frac{P^s}{15}$$

$$\frac{2000}{5} - \frac{3P^s}{15} = \frac{P^s}{15}$$

$$400 = \frac{4P^s}{15}$$

$$P^s = \$1500$$

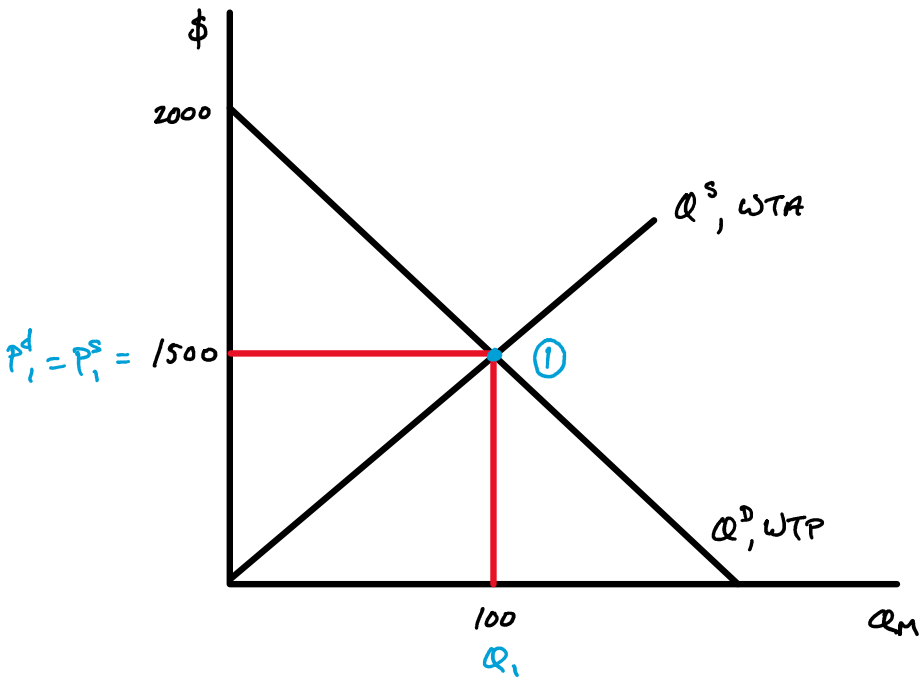
$$P^d = \$1500 + \$0 = \$1500$$

Find Q_M^D and Q_M^S:

$$Q_M^D = \frac{2000 - 1500}{5} = 100$$

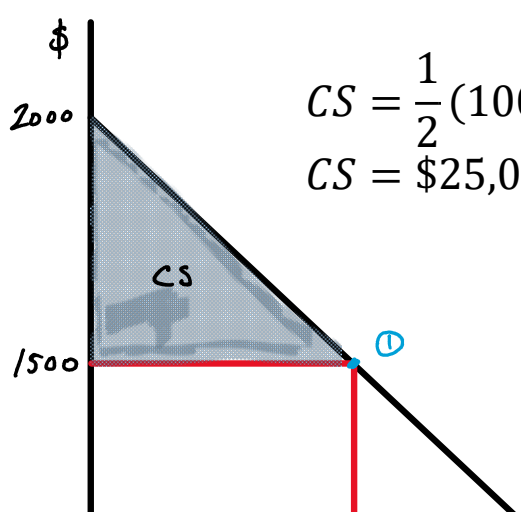
$$Q_M^S = \frac{1500}{15} = 100$$

Graphing:

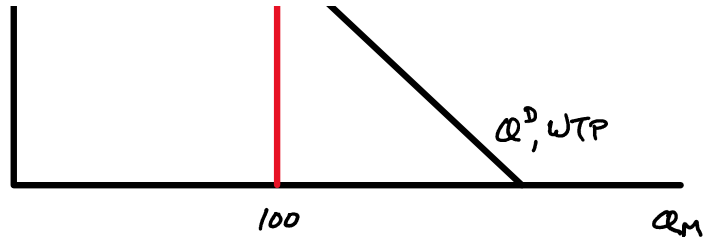


Impacts on welfare?

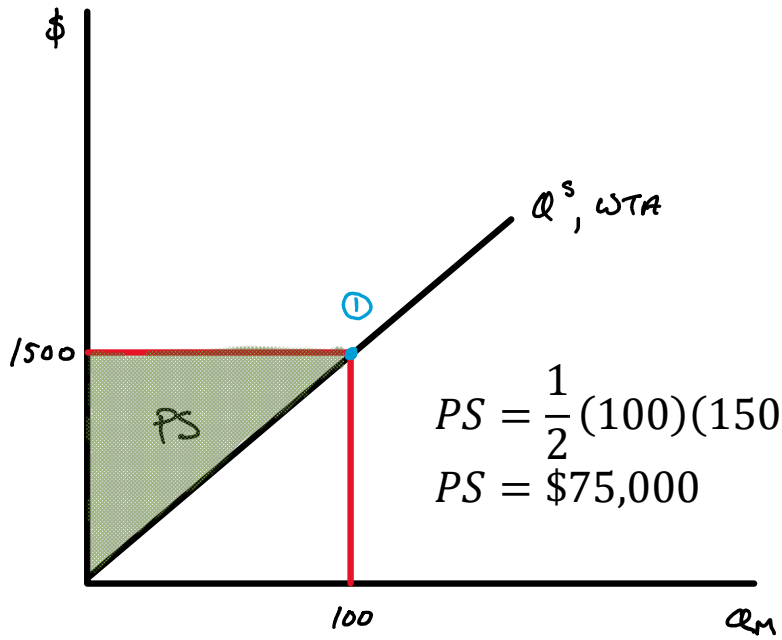
Consumer surplus



$$CS = \frac{1}{2}(100)(2000 - 1500)$$
$$CS = \$25{,}000$$



Producer surplus



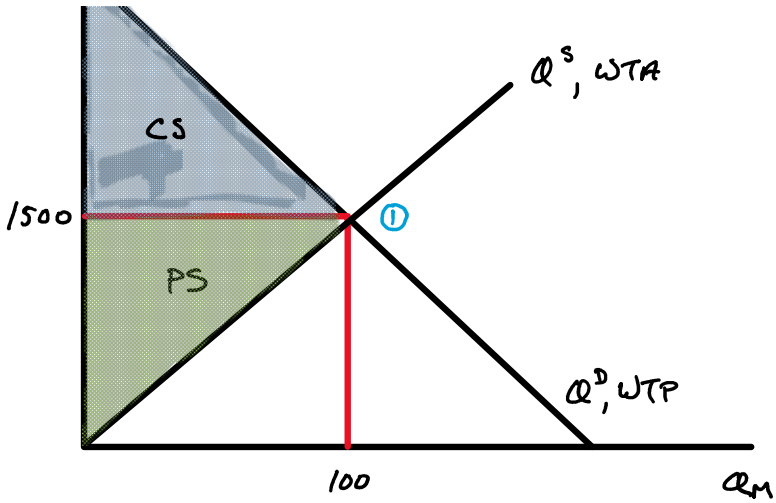
$$PS = \frac{1}{2}(100)(1500 - 0)$$
$$PS = \$75{,}000$$

Social surplus

$$SS = CS + PS$$

SS = \$25,000 + \$75,000 = \$100,000

Overlaying the graphs of CS and PS:


Q^S, WTA
CS
1500
1
PS
Q^D, WTP
100
Q_M