Price ceiling

Consider the bread market: The demand for bread is $Q_D = 50 - p$. The supply of bread is $Q_O = p$.

1. Calculate the consumer surplus and the producer surplus.
2. The government believes the equilibrium price is too high and signs a decree stating that the maximum price will be 20. Calculate the new consumer and producer surplus. Assume that it's impossible for a black market to form.
3. Is there an efficiency cost for this measure? Calculate it.
4. The government could achieve the same result of the maximum price if it imposes a tax on bread consumption and refunds what's collected. Explain how. How much should the tax be?

Solution

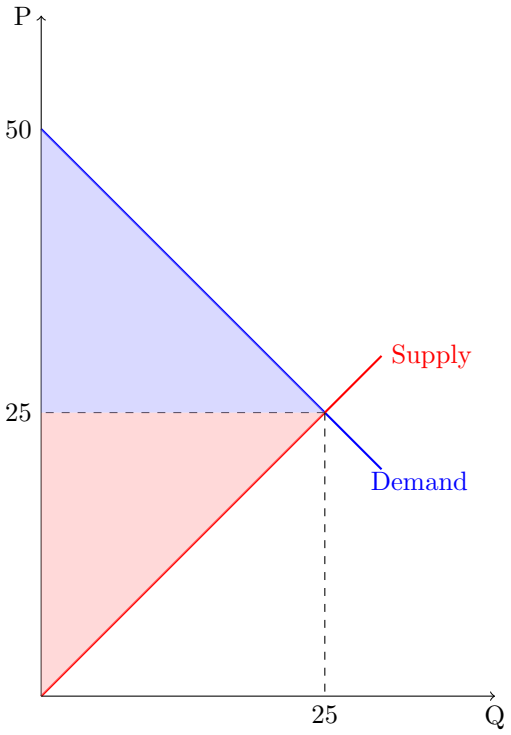
1. First, we calculate the equilibrium quantity and price:

$$50 - p = p$$

$$p = 25$$

$$Q = 25$$

Graphically:



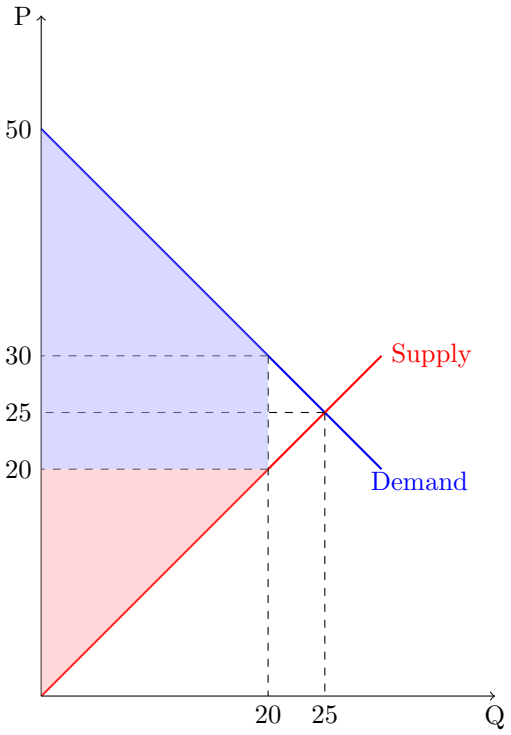
To calculate the consumer surplus, compute the area of the blue triangle:

$$\frac{base * height}{2} = \frac{25 * (50 - 25)}{2} = 312.5$$

To calculate the producer surplus, compute the area of the red triangle:

$$\frac{base * height}{2} = \frac{25 * 25}{2} = 312.5$$

2. If the government sets a maximum price that's below the equilibrium price, then the consumer and producer surpluses will be reduced. Graphically:



To calculate the producer surplus, compute the area of the new red triangle:

$$\frac{base * height}{2} = \frac{20 * 20}{2} = 200$$

For the consumer surplus, compute the sum of the blue triangle area with a rectangle:

$$\frac{20 * (50 - 30)}{2} + 10 * 20 = 400$$

3. To calculate the efficiency cost, compute the area of the two lost triangles and sum them:

$$\frac{5 * 5}{2} + \frac{5 * 5}{2} = 25$$

4. To calculate the tax, there should be a difference of 10 between the demander's price and the supplier's price:

$$p_d - p_o = 10$$

Thus:

$$p_o = p_d - 10$$

Calculate the new equilibrium:

$$50 - p_d = p_d - 10$$
$$60 = 2p_d$$
$$p_d = 30$$

Therefore:

$$p_o = 20$$

And the equilibrium quantity:

$$Q = 20$$

We have the same result as before.