Aggregate supply and partial equilibrium

Suppose that in a market there is an aggregate demand such that when the price is 10, consumption is 0 and when 10 is consumed, the price is 0. On the other hand, there are 2 firms with the following cost function: $C = Aq^2$ where A is a positive constant.

1. Find the aggregate demand function and the aggregate supply
2. Find the market equilibrium.
3. Calculate the producer and consumer surplus if $A = 1$
4. Is it better for consumers if A is larger or smaller? Why?

Solution

1. The inverse demand function is $P = 10 - X$. To obtain the supply function, we find the individual supplies: $marginalcost = 2Aq$. That is, each supply is $q = \frac{P}{2A}$. We add up the supplies: $S = \frac{P}{A}$.

2. We equalize supply and demand:

$$10 - P = \frac{P}{A}$$

$$\frac{10A}{1+A} = P^*$$

   The equilibrium quantity is:

$$q^* = 10 - \frac{10A}{1+A}$$

3. If $A = 1$ then $P = Q = 5$ and the producer and consumer surpluses are equal $PS = CS = 25/2$.

4. If A is larger, this reduces the consumer surplus, so it is better for A to be small. This is because A is part of the firm's marginal cost; a higher A makes the cost higher and therefore the price at which the firm provides ends up being higher.