Practice problems-Tax Incidence

Question 1

Let’s do it with vertical supply curve (perfectly inelastic) and see the incidence. Let $\alpha = 0.08$.

$$Q_s = 86, Q_d = 286 - 20p$$

The story is a market for strawberry. Strawberry is perishable, so sellers want to sell this fixed amount of strawberries in one day. And that is why we have a fixed supply curve. Now suppose government imposes a sale tax $\alpha$ on the strawberry and government collects this tax from consumers, how is the market affected?

**Solutions:**

**step 1:** We solve the equilibrium when there is no tax.

$$Q_s = Q_d^0$$

$$p^* = 10, Q^* = 86$$

**step 2:** derive the new supply curve or demand curve:

Since government collects tax from consumers, we know that there is a change in demand curve. So the new demand curve becomes

$$Q_d^1 = 286 - 20 \ast (1 + \alpha) \ast p$$

where $\alpha p^*$ is the amount of tax paid by consumers. Because consumers have to pay $p$ to buy the good from sellers, consumers actually paid $p + \alpha p$ to get the good.

**step 3:** Now we solve the new equilibrium:

$$Q_s = Q_d^1$$
Note: This $p^*$ is the price that consumers paid to sellers, in other words, sellers receive this $\frac{200}{21.6}$ by selling one unit of strawberry. However, since consumers still have to pay tax, consumers actually paid $(1+\alpha)p^*$, i.e., 10 to get one strawberry.

step 4: Let’s compare the new equilibrium with the original equilibrium:

No matter if there is a tax or not, consumers pay the same price: 10. However, sellers receive less when there is a tax. The reason behind is the supply elasticity. The supply curve is perfectly inelastic, which means that if sellers raise their price, consumers would not buy 86 strawberries. They will decrease their consumption of strawberries, and this is the situation that sellers don’t want to happen. So the only thing that sellers can do is to decrease the price till the point that consumers still pay same as before even after consumers pay all the tax. Only by this way, sellers are able to sell all the strawberries.

So, sellers pay all the tax, while consumers pay nothing of the tax. Sells bear all the tax burden.

Tax revenue is $\alpha \times p^*$, i.e., $0.08 \times \frac{200}{21.6}$.

Question 2

Suppose the demand curve for movie tickets has unitary price elasticity and the supply curve is perfectly price elastic. If 3 million tickets are currently sold at a price of 5, approximately how much tax revenue could the government generate from a 1 specific tax?

Solutions:

If we draw a graph for the market of ticket, we will know that the supply curve is a horizontal line. We have learned that it doesn’t matter if government collects tax from consumers or producers. So we can assume that gov’t collects this tax from sellers. And this will cause the supply curve to shift up by 1. We know before the tax, the price is 5 and quantity is 3. Then by shifting up the supply curve, the new price should be at 6. Now,
the task is to solve out the new quantity.

To solve the new quantity, we can use the demand elasticity.

\[ \epsilon = -1 = \frac{dQ}{dp} \times \frac{p}{Q} \]

We know that \( \epsilon = -1, \frac{dp}{dQ} = 1, p = 3, Q = 3 \). Putting those into the above equation, we can solve the new quantity, which is 2.4 million.

So the tax revenue is 1 \times 2.4, i.e., 2.4 million.