14.01 Problem Set 4

Due at 5pm on October 20th, 2023
Late problem sets are **not** accepted.

1 True or False (20 Points)

Determine whether the following statements are True or False. Explain your answers

1. *(5 Points)* In a competitive markets, price controls are always efficient.

2. *(5 Points)* If individual demands are $P = 3Q_1$ and $P = 2Q_2$ then aggregate demand is $P = 5Q$, where $Q = Q_1 + Q_2$.

3. *(5 Points)* Under free entry with identical firms, the price is equal to the average cost.

4. *(5 Points)* Free entry in a market drives down prices.

2 Minimum Price and Demand Elasticity (30 Points)

There are two different economies, characterized by the following demand for cars

$$\begin{aligned} Q_{D1} =& 2 - \frac{1}{2}p \\ Q_{D2} =& 2 - p \end{aligned}$$

Both economies have face the same supply of cars, given by

$$Q_S = p$$

1. *(5 Points)* Calculate the price elasticity of demand in each market.

2. *(5 Points)* Suppose these economies represent two major US cities: Boston and San Antonio. Boston is one of the most walkable cities in the US, whereas San Antonio is one of the most car dependent cities in the US. Which demand would you expect to correspond to each city?

3. *(5 Points)* What is the equilibrium price and quantity sold in each market?

4. *(5 Points)* Calculate the consumer and producer surplus for both markets.

Suppose the government decides set a minimum price of $\underline{p} = \frac{3}{2}$ to reduce car usage in order to fight climate change.

5. *(5 Points)* Find the new equilibrium price and quantity in each market. Which market had the largest change in the equilibrium quantity? How does this depend on the demand elasticity? Provide an economic intuition.

6. *(5 Points)* Calculate the change in consumer surplus, producer surplus and deadweight loss from the minimum price. Which market has the largest deadweight loss in response to the minimum price? Why? Provide an economic interpretation.

3 Market Surplus with Firm Entry (25 Points)

Consider the market for sugar. Assume the market is perfectly competitive, so all sugar producers are price takers. The demand in the US for sugar is

$$Q_D = 100 - 5p$$

The government regulates supply of sugar by not allowing foreign producers to sell in the US. Assume there are 5 producers in the US, whose long run cost function is $C(q) = \frac{1}{2}q^2$.

1. *(5 Points)* What is the individual and aggregate supply of sugar in the US?

2. *(5 Points)* What is the equilibrium price and quantity in this market? What is the consumer surplus and the producer surplus in equilibrium? What is the producer surplus of each individual firm?

Suppose local producers can destine their profits to put pressure on the government to avoid foreign producers to sell sugar in the US.

3. *(5 Points)* How much would the producer pay to put pressure on the government to keep the status quo and avoid entry of other competitors?

Suppose the government passes a the Sugar Reduction Price Act, allowing the entrance of foreign producers to the market. Foreign producers have the same long run cost function $C(q) = \frac{1}{2}q^2$, and the government allows five foreign producers to enter the market.

4. *(5 Points)* Calculate the new equilibrium price and quantity in this market. What is the change in consumer surplus and producer surplus? What is the change in the producer surplus of each individual firm?

5. *(5 Points)* True or False? Justify your answer: free entry not only transfers surplus from consumers to producers, but also increases aggregate welfare.

4 Market Surplus with Inelastic Supply (25 Points)

Consider the rental market in Cambridge. Supply is fixed at $Q_S = 5000$ and demand is given by

$$Q_D = 10000 - p$$

1. *(2 Points)* Calculate the equilibrium price and quantity in the market, and the consumer and producer surplus.

To help consumers, the government decides to subsidize rent by giving checks to consumers to help them pay rent. As a result the new demand is

$$Q_D = 12000 - p$$

2. *(5 Points)* Calculate the new equilibrium price and quantity, as well as the consumer and producer surplus.

3. *(5 Points)* Are consumers better off after this measure? Provide an economic intuition on why consumers are/are not better off after the subsidy (Answers that just refer to the change in consumer surplus without providing an economic interpretation will not receive full credit).

Suppose that instead of subsidize demand, the government decides to change zoning regulations to allow the construction of large buildings. As a result, supply increases to $Q_s = 7000$.

4. *(5 Points)* Calculate the new equilibrium price and quantity, as well as the consumer and producer surplus.

5. *(5 Points)* Are consumers better off after this measure? What about homeowners? Provide an economic intuition on why consumers are/are not better off after the subsidy (Answers that just refer to the change in consumer surplus without providing an economic interpretation will not receive full credit).

6. *(3 Points)* From the government's perspective, which one of the two measures discussed in this exercise is more effective if the goal is to improve the consumers' situation? Provide an explanation.

14.01 Principles of Microeconomics
Fall 2023