Problem Set 1

Due on Canvas at 12:00pm September 12th

Instructions: **No partial credit will be awarded.** All answers must be entered in the Problem Set 1 Quiz on Canvas. Note that it is not possible to edit your responses on Canvas after submitting. Best practice is to **complete the problem set on paper** and then transfer solutions to Canvas. You may collaborate on this problem set with other students in your learning team, but each student must submit his or her own solutions.

Grading: Grading is done on a 10-point scale across all problems in the problem set. Note that after submitting on canvas, you may see a score, but that does not include any points for any qualitative questions and is only a **preliminary** score. **Grades will be finalized a few days after the due date.**

Material covered: This problem set covers lectures 1-4 of the course.

Problem 1: Boycotts (5 points)

Note: This problem has been a tradition at Yale SOM for many years. It is a rite of passage for SOM economics students. To answer this problem requires no mathematics beyond arithmetic. Read the instructions carefully, and then feel free to talk about this problem with your fellow students. We advise such discussions to prevent you from wasting time. In the end you must see the answer yourself in your own "aha" moment and of course, the written answer must be your own.

Setup A frequently used instrument of economic coercion is the boycott. For example, a union involved in a serious and protracted conflict with some employer or group of employers may urge all of its sympathizers to stop buying the products of that employer or group, in the hope that the resulting economic losses will provide an incentive for the employers to make concessions. However, experience shows that the coercive power of a boycott is often small.

In this exercise, you are to use supply and demand analysis as a tool to understand the effects of boycotts. For the sake of concreteness and precision, most of the questions are posed in quantitative terms. However, the goal of the exercise is to develop your understanding of the logic of the market processes involved. Accordingly, if you have difficulty, don't try to overwhelm the problem with calculation -- rethink the economics.

Throughout the exercise, the following assumptions are to be maintained. First, the market in question is one to which simple supply and demand analysis is applicable: there are numerous buyers and sellers in the market; the good is homogeneous; buyers and sellers seek only to trade on the most advantageous possible terms and, aside from the complications introduced by the boycott, do not care with whom they transact. Second, the identities of buyers and sellers are fixed: in particular, no reselling of the goods takes place. Third, the set of buyers divides sharply into observers and nonobservers of the boycott, while the sellers separate equally sharply into those that are targets of the boycott and those that are not. Boycott observers will not, under any circumstances, buy from a target seller, while non-observers do not care from whom they buy. For simplicity, it is assumed that boycott observers account for the same fraction of demand at every price. Similarly, target sellers account for a certain fraction of the supply at every price.

Assume initially that in the pre-boycott situation, the market demand curve is described by:

$$Q_D = 5000 - 10P$$

where Q_D = quantity demanded and P = the price. The market supply curve has equation (with Q_S = quantity supplied):

$$Q_S = 50\,(P - 5)$$

except that, at prices of 5 or less, quantity supplied is zero.

Warmup problem (i): Determine the market equilibrium in the pre-boycott situation.

Warmup problem (ii): Suppose that buyers representing 70% of the original demand, observe the boycott. If all non-observers buy from target sellers, what is the demand curve facing target sellers?

Questions

Consider the three situations characterized by the following table

Situation	Observers as Fraction of Original Demand	Target as Fraction of Original Supply
A	3/4	3/4
B	1/4	1/4
C	1/2	1/4

For each of the three situations, determine the market equilibrium that would arise under boycott conditions. Give the quantities transacted by observing and non-observing buyers, and by target and non-target sellers.

Drawing on your results, state the general principle which relates the effectiveness of a boycott to the observance fraction and the target fraction. "Effectiveness," in this context, means lowering the price to target sellers. Can you provide some intuition as well?

Hint: Warmup problem (i) supplies all the mathematical knowledge you will need to solve the remaining problems. What is needed for the rest is an ability to structure the problem, and an understanding of simple economic principles. The point of the exercise is to determine whether the boycott is effective in any of the three cases above. To answer this question, you have been given the following information: (1) the market supply curve, (2) the targeted fraction of sellers, (3) the market demand curve, (4) the observers as a fraction of buyers. Items (1) and (2) imply that it is possible to write down algebraic expressions for the supply curves of targeted and non-targeted sellers. You can also choose to use Excel to get a sense of how prices get determined in each sub-market.

Problem 2: Airline Tickets (5 points)

From 2021 to 2025, the average price of airline tickets varied significantly. We will analyze the price changes using the simple tool of demand and supply.

Suppose that in 2021, when the airline industry was significantly affected by Covid restrictions, the supply function domestic flights in the U.S. was

$$Q_S(p) = 300 + 70p.$$

The demand for flights in 2021 was:

$$Q_D(p) = 600 - 30p,$$

where p is the price for a flight.

a) (0.5 points) Solve for the equilibrium in 2021. What is the equilibrium price? What is the equilibrium quantity?

b) (0.5 points) What is the demand elasticity at the equilibrium of 2021? What is the supply elasticity? Which one is more elastic?

c) (0.5 points) In 2021, the federal government supported the airline industry as part of the Covid rescue plan. Suppose that the support was in the form of $2 per-unit subsidy. What is the effective supply curve after this subsidy?

d) (1 point) What is the equilibrium price (paid by consumers and received by suppliers) and quantity after subsidy? What is the total amount of subsidy? What are the consumer surplus and the deadweight loss?

e) (0.5 points) Which side (consumers or producers) benefits more from the subsidy? Why?

f) (1 point) In 2025, as Covid eased and travel returned to pre-Covid level again, the demand of flights increased significantly. Suppose that the demand of flights in 2025 was

$$Q_D(p) = 800 - 20p.$$

In the meantime, the government subsidy program ended. What is the new equilibrium price and quantity? What is the consumer surplus?

g) (0.5 points) Are consumer better-off or worse-off in 2025? Why?

h) (0.5 points) In 2025, Amtrak also announced the new generation of the Acela train, which will begin to serve between Boston and Washington D.C. in 2027. With this faster train, the demand for flights will decrease. Suppose that the demand for flights will become

$$Q_D(p) = 400 - 50p$$

What will the equilibrium price and quantity be in 2027, and what do you expect will happen to the airline suppliers?