Homework 4 (37 Points)

`Solutions`

Part I: Multiple Choices (2 Points Each)

1. Which of the following statements is correct?

   (a) The demand for natural gas is more elastic over a short period of time than over a long period of time.

   (b) The demand for smoke alarms is more elastic than the demand for Persian rugs.

   (c) **The demand for bourbon whiskey is more elastic than the demand for alcoholic beverages in general.**

   (d) All of the above are correct.

2. When the price of a bracelet was $25 each, the jewelry shop sold 20 per month. When it raised the price to $35 each, it sold 14 per month. Assuming the demand curve didn't change during this time, the arc price elasticity of demand for bracelets is

   (a) 1.66.

   (b) **1.06.**

   (c) 0.94.

   (d) 0.60.

3. Pierre says that he will spend exactly 10 dollars a day on coffee, regardless of the price of coffee. Pierre's demand for coffee is

   (a) perfectly elastic.

   (b) **unit elastic.**

   (c) perfectly inelastic.

   (d) None of the above answers is correct.

4. Last month, sellers of good Y took in $100 in total revenue on sales of 50 units of good Y. This month sellers of good Y raised their price and took in $120 in total revenue on sales of 40 units of good Y. At the same time, the price of good X stayed the same, but sales of good X increased from 20 units to 40 units. Suppose changes in the sales of X are driven by demand shifts as a result of changes in the price of Y, we can conclude that goods X and Y are

   (a) substitutes, and have a cross-price elasticity of 0.60.

   (b) complements, and have a cross-price elasticity of 0.60.

   (c) **substitutes, and have a cross-price elasticity of 1.67.**

   (d) complements, and have a cross-price elasticity of 1.67.

5. The federal government is concerned about obesity in the United States. Congress is considering two plans. One will ban the production and sale of "junk food." The other will increase nutrition-education programs and include substantial advertising campaigns to encourage healthy eating habits. The junk-food ban program

   (a) and the education program will reduce the quantity of junk food sold and raise the price.

   (b) and the education program will reduce the quantity of junk food sold and lower the price.

   (c) **will reduce the quantity of junk food sold and raise the price. The education program will reduce the quantity of junk food sold and lower the price.**

   (d) will reduce the quantity of junk food sold and lower the price. The education program will reduce the quantity of junk food sold and raise the price.

Part II: Problems

Problem 1 (4 Points)

Suppose the market for a good can be represented by the following equations of supply and demand:

$$\begin{aligned} \text{Supply:} \quad & P = 0.05Q_S \\ \text{Demand} \quad & P = 20 - 0.15Q_D \end{aligned}$$

, where Q_S and Q_D denote respectively quantity supplied and quantity demanded.

1. What are the equilibrium price quantity in this market? (2 Points)
   $(W^*, Q^*) = (5, 100)$

2. What are the price elasticity of demand and the price elasticity of supply at this equilibrium? (2 Points)

$$\epsilon_{d,p} = \frac{dQ_D}{dW}\frac{W^*}{Q^*} = \frac{1}{.15}\frac{5}{100} = .33$$

$$\epsilon_{s,p} = \frac{dQ_S}{dW}\frac{W^*}{Q^*} = \frac{1}{.05}\frac{5}{100} = 1$$

Note: the result that $\epsilon_{s,p} = 1$ should also be readily apparent from the fact that the supply curve is linear and has zero intercept.

Problem 2 (9 Points)

Fred spends his monthly paycheck going out to dinners and going to concerts. His income varies from month to month as does the price of dinners out and the price of concerts. The table below shows the data on number of times he has eaten out each month as well as his income in the month as well as the prices he faced during each month.

Month	Income	Dinner Price	Concert Price	Quantity of Dinners out
Apr	200	10	20	10
May	400	10	20	20
Jun	200	20	20	5
Jul	150	15	30	5

1. To calculate Fred's price elasticity of demand for dinners out, we should use the data for the months of April and June because the (income/**dinner price**/concert price) differs between these months but everything else is the same. Fred's arc price elasticity of demand for dinners out is 1. (4 Points)

2. To calculate Fred's income elasticity of demand for dinners out, we should use the data for the months of April and May because the (**income**/dinner price/concert price) differs between these months but everything else is the same. Fred's arc income elasticity of demand for dinners out is 1. (4 Points)

3. Dinners out are a (**normal**/inferior) good. (1 Points)

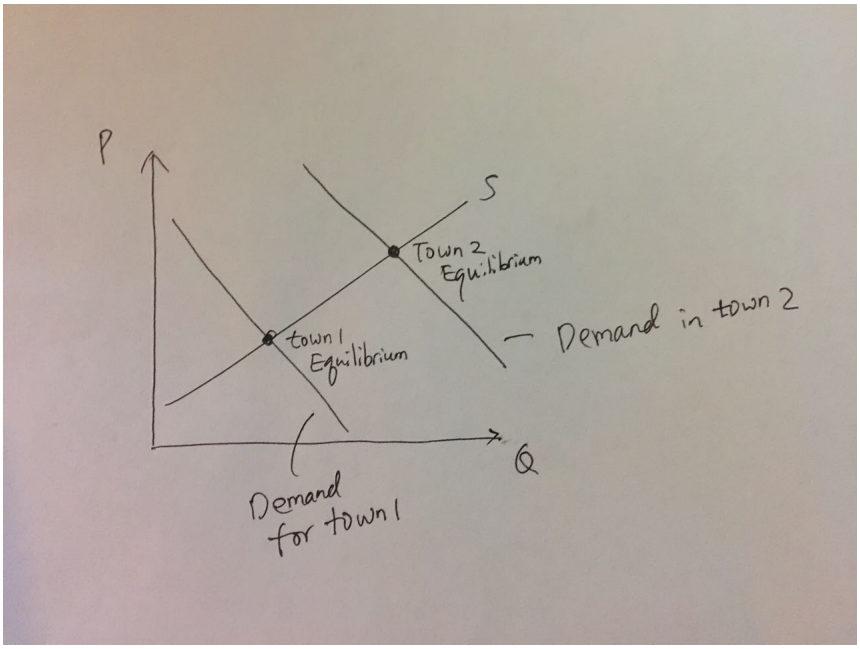
Problem 3 (4 Points)

In the article "The Indiana Jones of Economics," Robert Jensen talks about the difficulty of identifying Giffen behavior from data:

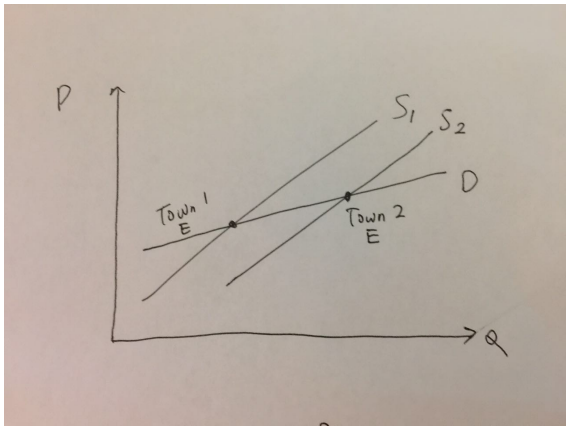
"Remember, we're looking for a positive correlation between price and consumption/demand — higher prices associated with higher quantity demanded, lower prices with lower quantity demanded. So, let's say we see a bunch of towns, and people living in those towns with the highest rice prices consume the most rice. Case closed, right? Not quite. Plain old economics tells us that if people want more of some good, its price goes up. So, we see high rice prices where there is high rice consumption, but did the high consumption cause the high price (economics as usual) or did the high price cause the high consumption (Giffen behavior)?"

Using supply and demand diagrams, explain what Jensen means. (4 Points)

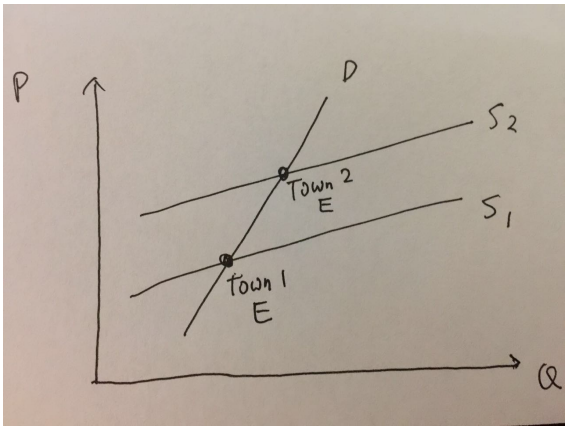
Scenario 1: Economics as Usual



Scenario 2: Giffen Behavior



or



If we only observe data on rice price and consumption in different towns, then we cannot differentiate between scenario 1 and 2. Both can explain the positive correlation between price and consumption (if exists). To make sure it is scenario 2, we need to make sure that the demand curve does not move. That's why Jensen uses experimental methods to discover Giffen behavior: by giving people subsidies, he[1] is able to change the prices that people face without changing their demand.

[1] and his coauthor Miller

Problem 4 (10 Points)

Researchers at Beijing Jiaotong University have studied the the price elasticity of demand for Beijing subway. Read their paper and discuss everything that is wrong in Section II "The Law of Demand and Price Elasticity" and Section IV "Analysis of Price Elasticity and Beijing Subway."

1. P26:

   > "For a good whose price elasticity is elastic, we can have more revenue by increasing its price. While, for a good whose elasticity is inelastic, we should decrease its price to make more profit."

   Wrong.

2. P28:

   > first stage (1991-1995): the relationship between ticket price and passenger volume obeys the law of demand and the price elasticity equals to 0.8811, negative. We can say the precondition of the law of demand is satisfied, namely ceteris paribus. For : 1. Only line 1 and line 2 were under operation during this period, the total cost can be considered to be the same; 2. The permanent resident population in Beijing increases slowly these years, the passenger source seems stable. As a consequence, the ticket price and the passenger volume changes coincide with the law of demand.

   Wrong:

   (a) To estimate demand elasticity, need to at least control for income, which could have grown significantly in Beijing between 1991 and 1995[2].

   (b) The authors discussed the cost of operating subway lines. This is irrelavant: to estimate the demand curve, we do not need to control for cost, since cost affects supply not demand. However, the information that only two lines were operating during the period is helpful, since it makes sure that demand did not increase as a result of new subway lines.

[2] China's GDP per capita increased 183% between 1991 and 1995.

3. P28:

> Second stage (1996-2000): the relationship between ticket price and passenger volume deviate from the law of demand at some degree.

Wrong. To prove the relationship did not obey the law of demand, we need to find a positive relationship between price and quantity demanded after controlling for other determinants of demand such as income, taste and population. The authors did not control anything. Indeed, they discussed how much ‘‘taste for traveling’’ had changed during this second period, unaware that this invalidates their argument.

4. P28:

> The third stage (2003-2008): much like the second stage, passenger volume is increasing constantly while ticket prices keep rising ... The abnormal phenomenon may be caused by the following factors ... The above factors work together and finally cause the relationship between ticket price and passenger volume different from the general cases.

Wrong. There is nothing abnormal about it and this case is as ‘‘general’’ as it can be.