

Economics 101  
Spring 2017  
Answers to Homework #3  
Due Thursday, March 16, 2017

**Directions:**

- The homework will be collected in a box **before** the large lecture.
- Please place your name, TA name and section number on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade.
- Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

Please realize that you are essentially creating “your brand” when you submit this homework. Do you want your homework to convey that you are competent, careful, and professional? Or, do you want to convey the image that you are careless, sloppy, and less than professional. For the rest of your life you will be creating your brand: please think about what you are saying about yourself when you do any work for someone else!

**Part I: Excise Taxes**

1. Suppose the demand and supply curves for goose-down winter jackets in 2014 were as given below:

$$\text{Demand: } P = 2000 - 50Q$$

$$\text{Supply: } P = 500 + 50Q$$

- Find the equilibrium price and the equilibrium quantity in 2014.
- Calculate the consumer surplus and producer surplus in 2014. Provide a graph of this market and show these areas on the graph.
- Compute the price elasticity of demand and supply at the equilibrium price. Use the point elasticity formula for the computation. At the equilibrium point, is demand elastic, unit elastic, or inelastic? Explain your answer.
- Find the range of prices where the demand is elastic, unit-elastic and inelastic.
- Given the above demand curve, what would be the price at which the total revenue (price \* quantity demanded) is maximized? What would the total revenue equal at that price?

Because of an extremely cold winter in 2015, the demand for goose-down winter jackets increased greatly. The result of this increase in the popularity of goose-down winter jackets is that at every quantity consumers are now willing to pay \$500 more per jacket. The supply of goose-down winter jackets did not change.

- Without doing any calculations, please explain in words what would happen to the equilibrium price and the equilibrium quantity in 2015 compared to those values in 2014?
- What is the equation for the demand curve in 2015? What is the new equilibrium price and the equilibrium quantity?

- h. Calculate the consumer surplus and producer surplus in 2015. Provide a new graph that illustrates these two areas.
- i. Is there any deadweight loss? If yes, calculate the size of the deadweight loss. If no, please explain your answer.

Now, the government is worried that an increased demand for goose-down jackets would endanger the goose population. This sentiment led to a **legislation of an excise tax** on the producers of goose-down jackets.

- j. Suppose that the government wants to implement an excise tax in this market so that consumers purchase the same number of jackets as they did in 2014. What would the size of the excise tax need to be in order for the government to successfully reach this goal? Provide the equation for the new supply curve with this excise tax. Then, calculate the new equilibrium price once this excise tax is imposed.
  - k. Calculate the consumer surplus, the producer surplus, the government tax revenue and the deadweight loss (if any) after the legislation of the tax you calculated in (j). Provide a graph that illustrates these areas. Make sure it is well labeled.
  - l. What are the consumers' tax incidence and the producers' tax incidence after the legislation of the tax in (j)?
  - m. Now assume that the government is aiming to **maximize its tax revenue not aiming to restore the 2014 equilibrium quantity**. What would be the amount of the excise tax that the government should charge to the producers to reach this goal? ***You are not allowed to use any calculus here.*** (Hint: The government revenue would be a quadratic equation of the size of the excise tax.)
  - n. Calculate the consumer surplus and the producer surplus and the deadweight loss (if any) after the legislation of the tax you calculated in part m. Compare your answers with that in part (k).
  - o. What is the total tax revenue? What are the consumers' tax incidence and the producers' tax incidence after the legislation of the tax in part (m)? Compare your answers with that in part (l). Provide a well labeled graph depicting CS, PS, DWL, CTI, PTI and tax revenue.
2. Draw **four** different sets of graphs of the excise tax  $T$  imposed on either consumers or producers (it does not matter which side of the market the excise tax is imposed on), where:
- (1) demand is elastic in the first graph for a given supply curve;
  - (2) demand is inelastic in the second graph for a given supply curve (that is the same as in (1));
  - (3) supply is elastic in the third graph for a given demand curve;
  - (4) supply is inelastic in the fourth graph for a given demand curve (that is the same as in (3)).
- Show graphically and then describe verbally how the incidence of the excise tax depends on the elasticity of demand/supply. In each graph have the excise tax be the same amount.
3. Repeat the same exercise as in question 2 (four different sets of graphs again) but now analyze how the deadweight loss changes and explain how the deadweight loss depends on the elasticity of demand/supply.

## Part II: International Trade (Tariffs and Quotas)

4. Suppose Country A is a small economy. The domestic demand for computers in Country A and the domestic supply of computers are given by the following equations where P is the price per computer in dollars and Q is the quantity of computers.

$$\text{Domestic Demand for Computers: } P = 1000 - 10Q$$

$$\text{Domestic Supply of Computers: } P = 100 + 50Q$$

- a. Calculate the equilibrium price, quantity, consumer surplus and producer surplus for the domestic market for computers when the Country A is in autarky (i.e. the market is closed to trade). Calculate total surplus. Illustrate your answer graphically.
- b. Suppose now that the Country A opens the market to international trade and that the world price of computers is \$ 100 per computer. Further, suppose that Country A is small relative to the global market. Given this information, what will be the new price for computers in the Country A market? How many computers will be consumed domestically? How many computers will be supplied domestically? How many computers will be imported/exported? Calculate the new consumer and producer surplus. How does the total surplus change as Country A opens this market to international trade? Illustrate your answer graphically.
- c. Suppose now that the world price of computers is \$ 400 per computer and that this small economy opens its computer market to trade. What will be the price of the computer in this market? How many computers will be consumed domestically? How many computers will be supplied domestically? How many computers will be imported/exported? Calculate the new consumer and producer surplus. Illustrate your answer graphically.
- d. The government of Country A now decides to support the domestic producers of computers and plans to levy a tariff of \$200 per imported computers. (The current world price of computers before the tariff is \$400.) What will be the new price of computers when this tariff is implemented? How many computers will be consumed domestically? How many computers will be produced domestically? How many computers will be imported/exported given this tariff? Calculate the consumer surplus, producer surplus, government revenue and deadweight loss (if any) with this tariff. Again, illustrate your answer graphically.
- e. Suppose instead of a tariff, Country A wants to implement an import quota which effectively gives the same result as the tariff of \$200. What would be the appropriate import quota? Calculate the consumer surplus, producer surplus, government revenue, license-holder revenue and deadweight loss (if any) from this import quota.
- f. Assume the government is trying to **maximize its tariff revenue**. The current world price of computers before the tariff is \$400. What would be the size of the tariff? **Calculate your answer without using calculus.** (Hint: Complete the squares!) What is the maximum government tariff revenue?
- g. Assume the government wants to implement a tariff that will provide tariff revenue equal to \$ 6,000. Calculate the two different tariffs that can provide the government with tariff revenue of \$ 6,000. Compare the deadweight loss of these two tariff rates and determine which one gives a smaller deadweight loss. (Hint: you don't have to calculate the deadweight loss.)

### Part III: Elasticity

5. Below are percentage and elasticities questions.

- a. Suppose the price has increased from \$125 to \$150. What is the percentage increase in prices?
- b. Suppose the price has decreased from \$150 to \$125. What is the percentage decrease in prices?
- c. Repeat a) and b) using the midpoint method. Comment on the finding.

From now on in this question, use the midpoint method to calculate the percentage changes.

- d. Write down the formula for the price elasticity of demand. The price of sparkling water has gone up from \$1.00 to \$1.50 per can, and the quantity demanded changes from 2500 to 1500 cans. What is the price elasticity of demand?
- e. Write down the formula for the income elasticity of demand. Determine the signs of the income elasticities of demand when the good is an inferior good and when the good is a normal good. Are the signs different for the two types of goods? Explain your answer.
- f. Annie's income decreases from \$1,300 to \$1,100 per month. Consequently, the number of times Annie goes to the cinema decreases from three times to once per month. What is her income elasticity of demand for cinema visits?
- g. Write down the formula for the cross-price elasticity of demand. Determine the signs of the cross elasticities of demand when the goods are complements and substitutes. Are they different? Explain your answer.
- h. Suppose the price of a cup of tea has gone up from \$2 to \$3. The demand for coffee changes from one cup per day to two cups. What is the cross-price elasticity of demand for these two goods? Is it consistent with what you have explained in (g)?

6. Demand for Good X has the equation below:

$$P = 100 - 3Q$$

- a. Find the point elasticity of the demand at each price  $p$  given the demand equation. Use the formula we learned in class. Calculate the quantity demanded at the given level of price and then compute the total revenue. **Get the tightest range for the price that maximizes the total revenue given the values of the total revenue only.** Fill in the following table with your answers:

Price	Quantity Demanded	Total Revenue	Point Elasticity
10			
20			
30			
40			
50			
60			
70			
80			
90			

- b. What price and quantity maximizes total revenue given this demand curve? What is the maximum total revenue?

### Part III: Time Management

In Homework 2, you were asked to track your time spent on each activity and compare them with your weekly expected number of hours for each activity. Following are some reflection questions.

- Did you have any difficulty in tracking your time?
- Is the difference between the actual time spent on each activity and your expectation large? Which activity has the largest difference and which has the smallest? What do you think the underlying reasons for the gap between the planned and the actual time spent?
- What activities do you think are “time-wasting”? How many hours do you spend on these? Do you want to reduce the time on these activities? Why or why not?
- Did you get any insight from the experiment?