

**University of Wisconsin-La Crosse**  
**Department of Economics**  
**ECO308 Intermediate Microeconomic Theory**  
**Associate Professor Giddings**  
**Fall 2011**

**Problem Set 2 Version 2: Due October 11<sup>th</sup>**

Please answer the following questions as succinctly as possible, while showing all of your work. While you may work with other students in your cohort while completing this assignment, I do expect that you turn in your own work. Please be neat, write your answers in order and staple your final result together.

1. Consider the competitive market for pork. The supply of pork is  $Q_s = 180 + 35p - 62p_h$ , and the demand for pork is  $Q_d = 171 - 18p + 20p_b + 3p_c + 4Y$ . The variable  $Q$  is the quantity of pork;  $p$  is the price of pork;  $p_h$  is the price of hogs;  $p_b$  is the price of beef;  $p_c$  is the price of chicken; and  $Y$  is income. Assume that  $p_h = \$1.50$ ,  $p_b = \$4$ ,  $p_c = \$3$ , and  $Y = \$12.5$ .
  - (1) Find the equilibrium price and quantity.
  - (2) Using the equations for processed pork demand and supply, solve for the equilibrium price and quantity in terms of the price of hogs,  $p_h$ ; the price of beef,  $p_b$ ; the price of chicken,  $p_c$ ; and income,  $Y$ .
  - (3) Calculate the price elasticities of demand and supply. Interpret these elasticities.
  - (4) Calculate the consumer surplus and producer surplus at the equilibrium.
  - (5) Calculate the income elasticity of demand. Interpret this elasticity.
  - (6) How much does the demand curve shift when income,  $Y$ , increases by one percent? Is pork a normal or inferior good?
  - (7) If  $p_h$  increases by one percent, how much does the supply curve shift? Which direction does it shift?
  - (8) Calculate the cross-price elasticity of demand between pork and beef? Interpret this elasticity.
  - (9) Suppose the government collects a specific tax of \$1.20 per kg from pork producers. What is the after-tax equilibrium price and quantity?
  - (10) What share of the tax is borne by buyers and sellers, respectively?
  - (11) What is the consumer surplus and producer surplus after the tax is imposed? What is the dead weight loss?
  - (12) Should the government tax the consumers of pork instead? Why or why not?
2. The equilibrium wage in the fast-food market is \$5 per hour and the equilibrium employment level is 400 hours per day. The elasticity of demand for labor is -0.3 and the elasticity of labor supply is 0.8. What will be the impact of a minimum wage that is 20 percent above the equilibrium? What is the consumer and producer surplus before and after the minimum wage law is passed?
3. The demand for air travel is summarized in the equation  $Q_d = 800 - 2P$ , where quantity is in millions of enplanements per quarter and price is in dollars per enplanement. How much would consumer surplus change if the rising cost of fuel led airlines to raise the price from \$150 to \$200?
4. Who is more likely to object to a proposed one percentage point increase in the city sales tax—the owner of a local liquor store or the owner of a local video rental store? Why?
5. Senator John. D. Diggle is considering imposing a \$1 per unit tax on either gasoline or twelve packs of soda pop. First lady Michelle Obama is encouraging him to impose the tax on soda pop as she believes it will reduce the consumption of soda among children thereby reducing the obesity epidemic in the United States. Al Gore, on the other hand, is encouraging that the tax be imposed on gasoline, thereby reducing the consumption of gas in the United States which will

not only lessen our reliance on foreign oil, but also reduce pollution. The senator has asked you, his trusty economist, to analyze which tax is the best policy to implement in terms of both efficiency and the normative issues implicated in the tax decision.

6.

The demand and supply functions for gasoline are as follows (where price is in dollars and quantity is in gallons of gas):

$$Q_d = 910 - 60P$$

$$Q_s = 140 + 160P$$

The demand and supply functions for cases of soda are as follows:

$$Q_d = 2,975 - 700P$$

$$Q_s = -700 + 525P$$

- a. Graph the supply and demand for gas based on the equations defined. What is the equilibrium price and quantity in this market?
- b. What is the elasticity of demand for gasoline?
- c. What is the elasticity of supply for gasoline?
- d. Analyze the welfare in the market for gasoline.
  - a. What is the consumer surplus for gasoline?
  - b. What is the producer surplus for gasoline?
  - c. What is the total welfare for gasoline?
- e. Now, suppose that the senator successfully lobbies for the imposition of the \$1 per gallon tax on gasoline.
  - a. What price will buyers pay after this tax is initiated?
  - b. What price will sellers receive after remitting the tax?
  - c. How many gallons of gasoline will be sold once this tax is initiated?
- f. Now analyze the changes in welfare due to the tax.
  - a. What is the change in consumer surplus for gasoline after the tax has been imposed?
  - b. What is the change in producer surplus for gasoline after the tax has been imposed?
  - c. How much revenue is transferred to the government from the imposition of the tax?
  - d. What is the resulting deadweight loss in the market for gasoline after the tax has been imposed?
- g. Graph the supply and demand for soda based on the equations defined. What is the equilibrium price and quantity in this market?
- h. What is the elasticity of demand for soda?
- i. What is the elasticity of supply for soda?
- j. Analyze the welfare in the market for soda.
  - a. What is the consumer surplus for soda?
  - b. What is the producer surplus for soda?
  - c. What is the total welfare for soda?

- k.** Now, suppose that the senator successfully lobbies for the imposition of the \$1 per gallon tax on soda.
  - a. What price will buyers pay after this tax is initiated?
  - b. What price will sellers receive after remitting the tax?
  - c. How many cases of soda will be sold once this tax is initiated?
- l.** Now analyze the changes in welfare due to the tax.
  - a. What is the change in consumer surplus for soda after the tax has been imposed?
  - b. What is the change in producer surplus for soda after the tax has been imposed?
  - c. How much revenue is transferred to the government from the imposition of the tax?
  - d. What is the resulting deadweight loss in the market for soda after the tax has been imposed?
- m.** Now consider the effect of the \$1 tax per unit on the two markets, soda and gasoline. On which market is the government revenue generated by the tax the largest? Discuss.
- n.** Now consider the effect of the \$1 tax per unit on the two markets, soda and gasoline. On which market is the change in consumer surplus due the tax the largest? Discuss.
- o.** Now consider the effect of the \$1 tax per unit on the two markets, soda and gasoline. On which market is the change in producer surplus due to the tax the largest? Discuss.
- p.** Now consider the effect of the \$1 tax per unit on the two markets, soda and gasoline. On which market is the deadweight loss due to the tax the largest? Discuss.
- q.** On which good should the senator impose the tax? Discuss.