

Tutorial: Taxation and Economic Surplus

1. Suppose the federal government requires beer drinkers to pay a \$2 tax on each case of beer purchased.

a. Draw a supply-and-demand diagram of the market for beer without the tax. Show the price paid by consumers, the price received by producers, and the quantity of beer sold. What is the difference between the price paid by consumers and the price received by producers?

b. Now draw a supply-and-demand diagram for the beer market with the tax. Show the price paid by consumers, the price received by producers the quantity of beer sold. What is the difference between the price paid by consumers and the price received by producers? Has the quantity of beer sold increased or decreased?

2. It is a hot day, and Bert is very thirsty. Here is the value he places on a bottle of water:

Value of first bottle \$7

Value of second bottle 5

Value of third bottle 3

Value of fourth bottle 1

a. From this information, derive Bert's demand schedule. Graph his demand curve for bottled water.

b. If the price of a bottle of water is \$4, how many bottles does Bert buy? How much consumer surplus does Bert get from his purchases? Show Bert's consumer surplus in your graph.

c. If the price falls to \$2, how does quantity demanded change? How does Bert's consumer surplus change? Show these changes in your graph.

Answer:

3. Ernie owns a water pump. Because pumping large amounts of water is harder than pumping small amounts, the cost of producing a bottle of water rises as he pumps more. Here is the cost he incurs to produce each bottle of water:

Cost of first bottle \$1

Cost of second bottle 3

Cost of third bottle 5

Cost of fourth bottle 7

a. From this information, derive Ernie's supply schedule. Graph his supply curve for bottled water.

b. If the price of a bottle of water is \$4, how many bottles does Ernie produce and sell? How much producer surplus does Ernie get from these sales? Show Ernie's producer surplus in your graph.

c. If the price rises to \$6, how does quantity supplied change? How does Ernie's producer surplus change? Show these changes in your graph.

4. Consider a market in which Bert from Problem 3 is the buyer and Ernie from Problem 4 is the seller.

a. Use Ernie's supply schedule and Bert's demand schedule to find the quantity supplied and quantity demanded at prices of \$2, \$4, and \$6. Which of these prices brings supply and demand into equilibrium?

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- b. What are consumer surplus, producer surplus, and total surplus in this equilibrium?
- c. If Ernie produced and Bert consumed one less bottle of water, what would happen to total surplus?
5. Suppose that a market is described by the following supply and demand equations:
 $Q_S = 2P$
 $Q_D = 300 - P$
- a. Solve for the equilibrium price and the equilibrium quantity.
- b. Suppose that a tax of T is placed on buyers, so the new demand equation is $Q_D = 300 - (P + T)$. Solve for the new equilibrium. What happens to the price received by sellers, the price paid by buyers, and the quantity sold?
- c. Tax revenue is $T \cdot Q$. Use your answer to part (b) to solve for tax revenue as a function of T . Graph this relationship for T between 0 and 300.
- d. The deadweight loss of a tax is the area of the triangle between the supply and demand curves. Recalling that the area of a triangle is $\frac{1}{2} \times \text{base} \times \text{height}$, solve for deadweight loss as a function of T . Graph this relationship for T between 0 and 300. (Hint: Looking sideways, the base of the deadweight loss triangle is T , and the height is the difference between the quantity sold with the tax and the quantity sold without the tax.)
- e. The government now levies a tax on this good of \$200 per unit. Is this a good policy? Why or why not? Can you propose a better policy?