

7 | CONSUMER & PRODUCER SURPLUS

Purpose: To provide practice in computing and understanding producer and consumer surplus.

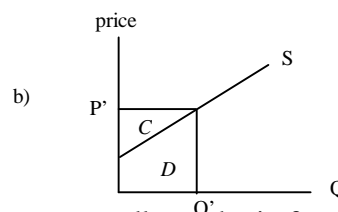
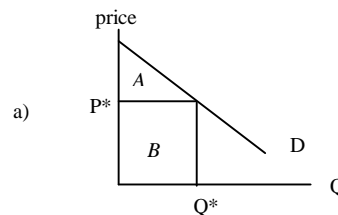
Computer file: **csps98.xls**

Instructions and background information:

The concepts of producer and consumer surplus help economists make welfare (normative) judgments about different ways of producing and distributing goods. For example, we might want to know whether the current level of production of pizzas is the best one from society's point of view, or whether social welfare might be improved by having more or less pizza. If current pizza production is socially optimal, then the amount of society's resources being devoted to pizza is about right. Analyzing consumer and producer surplus allows us to say whether current production is optimal or not.

Consumer surplus is the difference between the value to buyers of a level of consumption of a good and the amount the buyers must pay to get that amount. Consumer surplus is the welfare consumers get from the good.

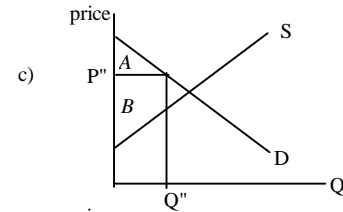
Consumer surplus can be estimated from the demand curve for a good. Graph a) shows the demand curve for pizza, and Q^* pizzas are being consumed. Suppose that pizzas sell for P^* , the highest price that could be charged for Q^* . The value consumers place on consuming Q^* is the area $A+B$. But consumers pay only P^* for each pizza, paying P^* times Q^* in all. Consumers get a value $A+B$ at a cost of B . The area A is the consumer surplus.



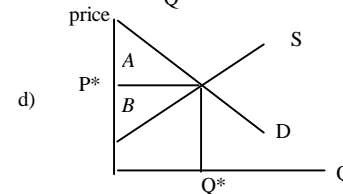
Producer surplus is the difference between the revenue sellers take in from sale of a good and the minimum amount they would accept to produce it. Producer surplus is the welfare sellers get from selling a good.

In a competitive market, producer surplus can be estimated from a good's supply curve. The graph b) shows the supply curve for pizza, and Q' pizzas are being sold. Suppose pizzas sell for P' , the lowest price that would induce sellers to sell Q' . Pizza firms have receipts of Q' times P' (area $C + D$), but would be willing to sell Q' for an amount equal to area D . The producer surplus is area C . It's the welfare sellers get from the good.

Graph c) shows the total producer and consumer surplus in a pizza market where Q'' is sold at a price P'' . Consumer surplus is A , and producer surplus is B . The total welfare from the good is $A+B$. This is the value of the good to buyers minus the cost to sellers.



The total surplus will be maximized (under most conditions) if the free market equilibrium prevails. In graph d) the sum of producer and consumer surplus is $A+B$, and total welfare is a maximum.



Open the file **csps98.xls**. What you see are demand and supply curves for pizza in a hypothetical market. You're asked to compute the values of the concepts just introduced: The value of the good to buyers, the cost to sellers, and the producer and consumer surplus. As with elasticity, it's more important to understand the concept than to know how to compute it. But being able to compute the values will give you confidence in using the concepts when you need them, and also illustrate the practical importance of the ideas for public policy.

Here are some things to watch for and learn as you do the problems:

- 1) Notice that you need to know quantity and price to compute the surplus. A lower price will always increase the consumer surplus. A higher price will increase the producer surplus.
- 2) In a competitive market, equilibrium price and quantity will also be the price and quantity that maximize the total surplus. This is one reason economists seem to have a love affair with competitive markets.

Here are some hints to help you get the answers quicker:

- 1) You'll need a calculator to do the computations. The area of a right triangle is $(1/2) \times \text{base} \times \text{height}$.
- 2) Draw a sketch of the graphs on a piece of scrap paper, and label the crucial points by referring to the worksheet display of the graph. You'll need to know where the supply and demand curves intersect the price axis. Set quantity to zero to find these numbers.
- 3) At one point you'll need to find the equilibrium price and quantity in the market. Use Goal Seek (or experimentation) to find the value of quantity that makes the difference between the buyer's price and seller's price equal to zero.

PRODUCER AND CONSUMER SURPLUS

Questions

Set all variables to their baseline values, and set quantity to 20.

- 1) What must price be to have consumers want to purchase this quantity?
[Hint: It's the Buyer's Price (BP).]

Set all variables to their baseline values, and set quantity to 20.

- 2) What's the total value to consumers of 20 units of output?

Set all variables at their baseline values, and set quantity to 20.

- 3) If the price consumers must pay is the buyer's price, how much must they spend on the good?
- 4) Based on your answer to the last question, what is the amount of Consumer Surplus when 20 units are sold at the buyer's price?

Set all variables to their baseline values and increase the output to 25.

- 5) What's the new buyer's price of the good?
- 6) What's the amount of Consumer Surplus when quantity is 25, and the good sells at the buyer's price?
- 7) What's the change in Consumer Surplus compared to what you found in question 4?

Set all variables to their baseline values, and set the quantity to 20.

- 8) What must price be to induce producers to sell exactly 20 units of output?
[Hint: It's the seller's price (SP).]

Set all variables to their baseline values, and set quantity to 20.

- 9) If the price producers receive is the seller's price, how much are the producers' receipts?
- 10) With quantity still at 20, what are the total costs of producers?
- 11) If quantity is 20, and if producers receive the seller's price for that output, what is the amount of Producer Surplus?

Set all variables to their baseline values and increase the output to 25.

- 12) What's the new seller's price of the good?
- 13) What's the amount of Producer Surplus when quantity is 25, and the good sells at the buyer's price?

[Warning: Be sure to compute at the BUYER'S price.]

Set all variables to their baseline values, and. set quantity to 25.

- 14) If the good sells at the buyer's price, what is the sum of consumer and producer surplus?
- 15) With quantity at 25, print the graph. On your printout, shade in the area that shows the total surplus (consumer plus producer). **TURN IN THE PRINTOUT WITH YOUR ANSWER SHEET!** (If you save your answer sheet as a file, and submit it electronically, you should turn in the printout as requested by your instructor.)
- 16) At what quantity is the sum of producer and consumer surplus maximized?
- 17) What is the maximum amount of consumer surplus plus producer surplus?
[NOTE: This is the total welfare from the good when the free market output is produced.]
- 18) With quantity at the level where the total surplus is maximized, print the graph. On your printout, shade in the area that shows the total surplus. **TURN IN THE PRINTOUT AS REQUESTED BY YOUR INSTRUCTOR.**