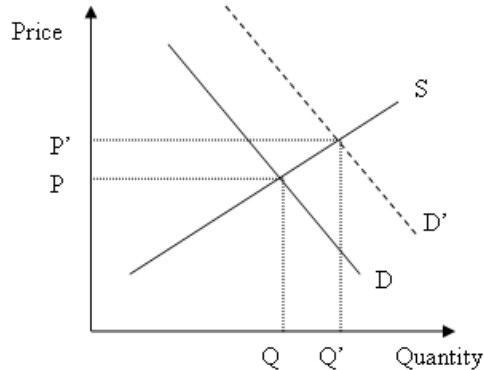


**14.01 Fall 2010**  
**Problem Set 1 Solutions**

1. (25 points) For each of the following scenarios, use a supply and demand diagram to illustrate the effect of the given shock on the equilibrium price and quantity in the specified competitive market. Explain whether there is a shift in the demand curve, the supply curve, or neither.

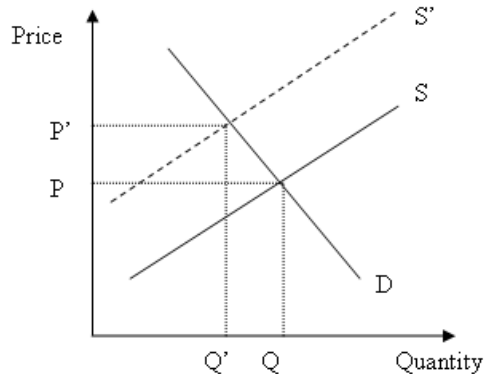
- (a) (5 points) An unexpected temporary heat wave hits the East Coast. Show the effect in the ice cream market in New England.

The temporary heat wave shifts the demand curve to the right from  $D$  to  $D'$ . As a result, equilibrium price and quantity both go up.



- (b) (5 points) The government introduces a tax on ice cream which is paid by producers. What is the effect in the ice cream market?

The supply curve shifts up from  $S$  to  $S'$  by the amount of the tax. As a result, the equilibrium price increases and the equilibrium quantity decreases. However, the rise in the equilibrium price from  $P$  to  $P'$  is smaller than the tax.



- (c) (5 points) China and Mexico are major producers of textiles. Workers in Mexico decide to go on strike. Show the effect on the market for Mexican textiles.

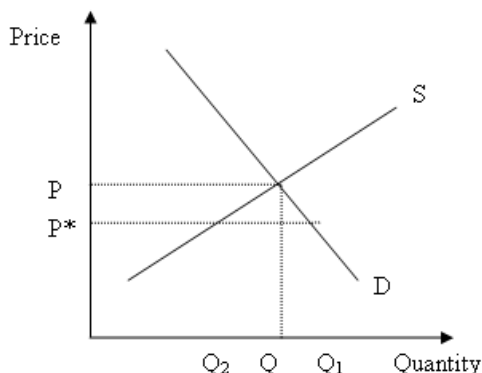
The supply curve for Mexican textiles shifts to the left. This results in a higher equilibrium price and lower equilibrium quantity in the market for Mexican textiles.

- (d) (5 points) Show the effect of the situation described in (c) on the market for Chinese textiles.

The demand curve for Chinese textiles shifts to the right. This results in a higher equilibrium price and higher equilibrium quantity in the market for Chinese textiles.

- (e) (5 points) Suppose the government imposes a price cap on bottled water. Show the effect in the bottled water market.

If the price ceiling  $P^*$  is set below the equilibrium price  $P$ , then there will be a shortage of bottled water in the amount of  $Q_1 - Q_2$  and bottled water will be rationed. If the price ceiling is above the equilibrium price, then there is no effect.



Problem 1 solution courtesy of William Wheaton. Used with permission.

2. (20 points) For each of the following pairs of goods, identify which one you would expect to have more own-price elastic demand. Please explain your reasoning.

- (a) (5 points) Computers (generally) vs. Apple MacBook Pro laptops.  
 Apple MacBook Pro, because it is a specific brand and has more substitutability.
- (b) (5 points) Stereo headphones (generally) vs. hearing aids.  
 Stereo headphones, since they tend to be less of a necessity good than hearing aids.

For each of the following goods, identify whether you would expect demand to be more (own-price) elastic in the short run or the long run. As above, please briefly explain your reasoning.

- (c) (5 points) Retail gasoline in the suburbs of Chicago.  
 More price elastic in the long run, because people cannot effectively adjust to necessity goods like gasoline in the short run, while in the long run, people can substitute it with electricity (hybrid cars), diesel, public transportation, etc.
- (d) (5 points) Air conditioning units in Miami Beach, Florida.  
 More price elastic in the short run, because there are other good substitutes in the short run, such as fans. If there were a sudden increase in the price of A/C units, people could delay their purchase of a unit for a few days or weeks. But in the long run, there is no good substitute for A/C.

Problem 2 solution courtesy of Luke Stein. Used with permission.

3. (30 points) Consider the market for apple juice. In this market, the supply curve is given by  $Q_S = 10P_J - 5P_A$  and the demand curve is given by  $Q_D = 100 - 15P_J + 10P_T$ , where  $J$  denotes apple juice,  $A$  denotes apples, and  $T$  denotes tea.

- (a) (7 points) Assume that  $P_A$  is fixed at \$1 and  $P_T = 5$ . Calculate the equilibrium price and quantity in the apple juice market.  
 We have the system of equations  $Q = 10P_J - 5 \cdot 1$  and  $Q = 100 - 15P_J + 10 \cdot 5$ . Solving for  $P_J$  and  $Q$  we get that  $P_J = 6.2$  and  $Q = 57$ .
- (b) (7 points) Suppose that a poor harvest season raises the price of apples to  $P_A = 2$ . Find the new equilibrium price and quantity of apple juice. Draw a graph to illustrate your answer.

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