

**Economics 102**  
**Spring 2012**  
**Homework #2**  
**Due 2/15/12**

**Directions:** The homework will be collected in a box **before** the 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. Please remember the section number for the section **you are registered**, because you will need that number when you submit exams and homework. Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

1. Consider a market for music players where the demand curve is  $Q = -P/2 + 50$ . The supply curve is  $P = Q + 10$ .  $Q$  is the number of music players and  $P$  is the price per music player.
  - a. What is the equilibrium price and quantity?  
 $-P/2 + 50 = P - 10$ . So  $P = 40$ ,  $Q = 30$ .
  - b. Calculate the values of consumer surplus (CS) and producer surplus (PS) in this market.  
 $CS = (100 - 40) * 30 / 2 = 900$ .  $PS = (40 - 10) * 30 / 2 = 450$ .
  - c. Now suppose people are buying twice as much at each price as they did initially. What is the new demand curve equation? And, what is the new equilibrium price and quantity in this market?  
The new demand can be written as  $Q = 2 * (-P/2 + 50) = -P + 100$ .  $-P + 100 = P - 10$ . So  $P = 55$ ,  $Q = 45$ .
  - d. Return to the original demand and supply curves. Now suppose supply decreases by 3 units at each price level. What is the new supply curve equation? And, what is the new equilibrium price and quantity in this market?  
The new supply curve can be written as  $Q = P - 10 - 3 = P - 13$ .  $-P/2 + 50 = P - 13$ . So  $P = 42$ ,  $Q = 29$ .
  - e. Return to the original demand and supply curves. Suppose the government implements a price ceiling of \$35 in this market. Does this price ceiling cause a shortage or surplus of the good? Provide a numeric measure in your answer.  
If the price ceiling of \$35 is imposed, Producers will produce at most  $35 - 10 = 25$  music players, while consumers will demand  $-(35/2) + 50 = 32.5$  music players. Thus there is a shortage of  $32.5 - 25 = 7.5$  music players.
  - f. Given the information in part (e) of this problem, calculate the values of consumer surplus (CS) and producer surplus (PS).  
CS with the price ceiling is composed of a triangle and a rectangle. The value of CS can be calculated as  $(1/2)(\$100 \text{ per music player} - \$50 \text{ per music player})(25 \text{ music players}) + (\$50 \text{ per music player} - \$35 \text{ per music player})(25 \text{ music players})$  or \$1000.  
PS with the price ceiling is equal to  $(1/2)(\$35 \text{ per music player} - \$10 \text{ per music player})(25 \text{ music players})$  or \$312.50.
  - g. Given the information in part (e) of this problem, calculate the deadweight loss due to the

imposition of this price ceiling.

$DWL = (\$50 \text{ per music player} - \$35 \text{ per music player}) * (30 \text{ music players} - 25 \text{ music players}) / 2 = \$37.50.$

- h. Return to the original demand and supply curves. Suppose the government implements a price ceiling of \$45 in this market. If the price ceiling of \$45 is imposed, does this cause a shortage or surplus of the good?

Since the equilibrium price without any restriction is \$40, the price ceiling doesn't bind. So there is neither shortage nor surplus in this market.

- i. Return to the original demand and supply curves. Suppose the government implements a price floor of \$45 in this market. If the price floor of \$45 is imposed, does this cause a shortage or surplus of the good in the market? Provide a numeric measure in your answer.

If the price floor of \$45 is imposed, Producers will produce  $45 - 10 = 35$ , while consumers will demand  $-(45/2) + 50 = 27.5$ . Thus there is a surplus of  $35 - 27.5 = 7.5$  music players.

- j. Return to the original demand and supply curves. Suppose the government implements a price floor of \$35 in this market. If the price floor of \$35 is imposed, does this cause a shortage or surplus of the good? Provide a numeric measure in your answer.

Since the equilibrium price without any restriction is \$40, the price floor of \$35 doesn't bind. So there is neither shortage nor surplus.

2. Let's think about the iPhone (the smartphone produced by Apple) market. For each of the following situations describe the impact on the demand and supply curves for iPhones given the scenario. Then, describe the effect on the equilibrium price and quantity in this market for each of the given scenarios. Assume that there are no other changes than the changes described in each part.

- a. Apple introduces a new version of the iPhone, and the popularity of owning an iPhone increases.

The new iPhone positively influences the tastes and preferences of consumers. Thus the demand curve shifts right. The equilibrium price increases and the equilibrium quantity increases.

- b. Google introduces a new android smartphone (Google is a different company than Apple and they also produce a smartphone similar to the iPhone).

Android smartphones are substitutes. So the demand curve for iPhones shifts left. The equilibrium price decreases and the equilibrium quantity decreases in the iPhone market.

- c. Holding everything else constant, the price of the Android smartphone increases.

An increase in the price of the Android smartphone relative to the price of the iPhone is an example of a substitute good getting more expensive. So the demand curve for iPhones shifts right. The equilibrium price increases and the equilibrium quantity increases in the market for iPhones.

- d. There is a huge increase of the number of students this year and each new student needs an iPhone.

The demand curve for iPhones shifts right. The equilibrium price increases and the equilibrium quantity increases.

- e. Apple has a technological break-through and as a result the production cost of the iPhone decreases by 50%.

Positive technological changes shift the supply curve for iPhones to the right. The equilibrium price decreases and the equilibrium quantity increases.

- f. All the Apple workers have been on strike and finally the strike is settled with Apple workers winning the negotiation and getting a 10% increase in their wage.

Since the price of a factor of production for Apple increases, the supply curve for iPhones shifts left. The equilibrium price increases and the equilibrium quantity decreases.

- g. Some of the factories which produce computer chips for iPhones shut down due to a flood.

This means the price of a factor of production for iPhones increases. So the supply curve for iPhones shifts left. The equilibrium price increases and the equilibrium quantity decreases.

3. Consider a small country and the music player market in this country. Let the domestic demand for music players in the small economy be given by  $P=80-Q$ . Let the domestic supply for music players in the small economy be given by  $P = 3Q$ . Hint: in this problem you will get some fractions: that is okay!

- a. If the country is closed to trade (autarky), what is the equilibrium price and quantity?

$80-Q=3Q$ . So  $Q=20$ ,  $P=60$ .

- b. Suppose the world price for a music player is \$30. If the country opens its music player market to trade, what quantity of music players will be imported or exported into this country? Explain how you got your answer.

If the price is \$30, the domestic supply will be  $Q=10$  and the domestic demand will be 50. So  $50-10=40$  music players will be imported.

- c. Suppose this small country has opened its music player market to trade. In this question consider only the response of domestic consumers and domestic producers in the music player market. The government of the small country proposes to impose a tariff on music players. Will the domestic consumer be for or against imposing this tariff? Will the domestic producers be for or against imposing this tariff? Explain your answer.

With the tariff the domestic price of music players will be greater than the world price of \$30. Hence domestic consumers would be against imposing a tariff and domestic producers would be in favor of imposing a tariff.

- d. Suppose the government imposes a tariff of 10 dollars on music players. What is the government's tariff revenue? What is the demand and supply price for music players with the imposition of this tariff?

The price of music players in the small economy with the tariff will be \$40. So the domestic demand will be 40 music players, the domestic supply will be  $40/3$  music players, and  $40-40/3=80/3$  music players will be imported into the small economy. The

government tariff revenue will be  $(80/3) \cdot 10 = \$800/3$ . Everyone in this small country faces the price of \$40 per music player.

- e. Calculate the deadweight loss from the imposition of the tariff described in part (d) of this problem.

$$DWL = (40/3 - 10 + 50 - 40) \cdot 10/2 = \$200/3.$$

- f. Suppose the world price for a music player rises to \$70. If the small country is open to trade, what quantity of music players will be imported or exported?

If the price is \$70, the domestic production will be  $70/3$  music players and the domestic demand will be 10 music players. So  $70/3 - 10 = 40/3$  music players will be exported.

- g. Will the domestic consumer be for or against free trade given this world price of \$70 per music player? Will the domestic producers be for or against trade at this world price of \$70 per music player? Explain your answer.

If the market is not open, the price is \$60 per music player. Hence domestic consumers would be against free trade and domestic producers would be for trade.

- h. Assume the world price of music players is still \$30 and this small economy is open to trade in its market for music players. Suppose the government in this economy decides to implement a quota to restrict trade. In addition, the government wants to ensure that the quota rent from imposing the quota is the same as the tariff revenue generated from the previous policy. What should the amount of the quota be in order for the quota rent to equal the tariff revenue? What is the deadweight loss with this policy?

To give an intuitive answer, the amount of the quota will be the same as the amount of imports with the tariff, which is  $80/3$ . The deadweight loss is the same with the quota or with the tariff if the quota rent is equal to the tax revenue.

If you want to look for a more mathematically accurate answer, you can solve for the quota and the price with the quota to get two equations in two unknowns. You will get two correct answers, which are  $(\text{Quota}, \text{Price with quota}) = (80/3, 40)$  or  $(40/3, 50)$ .

The first quota,  $80/3$ , is the same as the imports with the tariff and the price is the same as the price with the tariff. The deadweight loss is also the same –  $200/3$ .

The second is a lower quota, which of course results in a higher price and a higher deadweight loss of  $800/3$ . So, given that the quota rent is the same for both policies, it is more efficient to adopt the pair  $(80/3, 40)$  rather than  $(40/3, 50)$ .