I. Welfare Economics

Recall from earlier chapters we discussed the difference between positive economics (what will happen) vs. normative economics (what should happen). In our analysis of supply and demand and its applications we have discussed what will happen to prices and quantity given some demand and supply curve. We never addressed whether or not society is better off at the given equilibrium quantity. At the equilibrium quantity is society producing too much, too little or just enough? **Welfare economics** is the branch of economics that studies whether or not the allocation of goods is optimal from society's point of view.   In this chapter we introduce the tools needed to address this question.

A. Consumer Surplus

When the first Star Wars prequel, "The Phantom Menace" came out in 1999, geeks all across the country waited in lines for days (some for weeks) to see the movie. Some of these fanatics waited their whole lives to see this movie. For these fans, their **willingness to pay** (the maximum amount a consumer would be willing to pay for a good or service) to watch the film probably would have been several hundreds of dollars (of course they had no idea how bad it really was).

Suppose the movie ticket they were charged was $8.50 for the ticket.   For these geeks in line, they would have been very happy. Instead of having to pay hundreds of dollars for the movie which they were willing to do, they only had to pay $8.50 for the ticket. Clearly these moviegoers benefit from the fact they paid a lower price than what they were willing to pay. We can actually measure this difference between what the consumers were willing to pay for the movie ticket and what they actually paid through the concept of **consumer surplus.** Consumer surplus exists because households do not reveal what they are willing to pay and thus sellers can only charge one price to all its customers.

Consider an example where you haven't eaten all day and you're extremely hungry when you come across a McDonald's.   You're so hungry that you will be willing to pay $20 for a Big Mac if you had no other choice. However, chances are you're not going to go to the cashier and tell them you would be willing to pay more than the stated price of $3 for the Big Mac. Thus you will have a consumer surplus of $17.

Recall that the demand curve shows what individuals are willing to pay at each quantity demanded. Thus the area under the demand curve and above the price line will measure the amount of consumer surplus.

Example: Figure 1 shows the market demand curve for Harry Potter and the Half Blood Prince DVD. The demand curve shows that at a price of $90 for the DVD, there would be no one would purchase the DVD.   However, if the price drops slightly to $75, 30 DVDs would be sold to some very hard core Harry Potter fans. Suppose the equilibrium price is at $20 and

equilibrium quantity is 1000 DVDs. We know that there were 30 people who would have been willing to pay $75 for the DVDs (but only had to pay $20) clearly benefit. In fact, any individual who would have been willing to pay more than $20 for the DVD would have had some benefit. To measure the total benefit to all consumers, we can calculate the area of the blue triangle in Figure 6 which represent the consumer surplus. In this example, consumer surplus will be equal to (1/2 x $70 x 1000) = $35,000.

Figure 1: Consumer Surplus
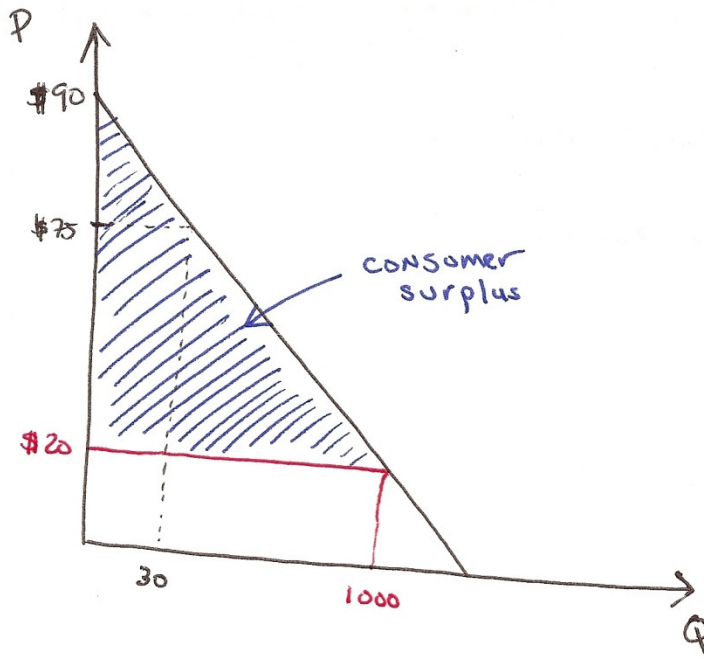
Intuitively, we know that lower prices will make consumers better off, but now we have the ability to measure how much lower prices will benefit consumers through consumer surplus. Suppose that prices of the DVD's falls further to $10. Figure 2 illustrates the effect of the lower price on consumer surplus. At the lower price level, the area between the demand curve and the price consumer pays will increase. In this example, consumer surplus will equal to (1/2 x $80 x 1500) = $60,000 which is much higher than the $35,000 before.

Figure 2: Lower Prices and Higher Consumer Surplus
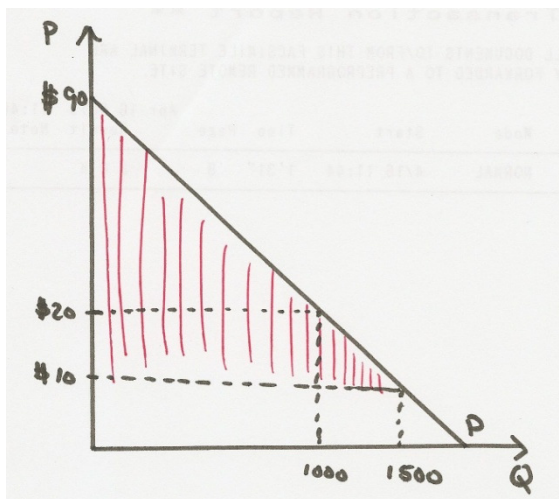
Consumer Surplus will increase due to lower prices for 2 reasons:

(1) Existing customers will get greater surplus because the price they actually have to pay will be lower than before and

(2) Additional consumer surplus will come from new customers. Some households who were unwilling to purchase the DVD at $20 would be now willing to buy the DVD at $10. For example, if a household was willing to pay $15 for the DVD, they will now be able to buy the DVD and gain some consumer surplus.
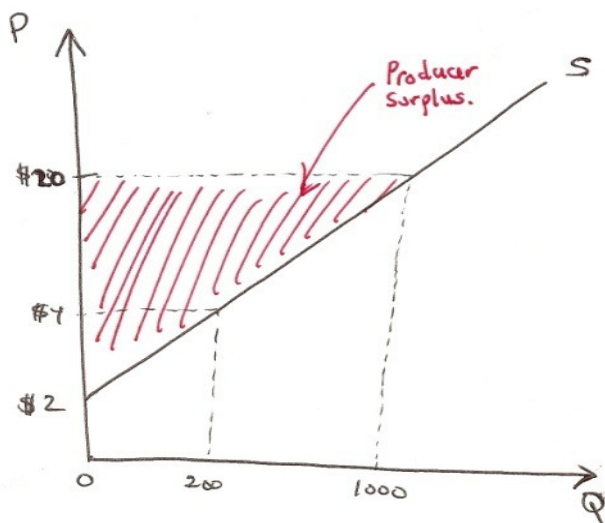
B. Producer Surplus

A similar concept exists for firms. Some firms are more efficient than other firms and have lower costs in producing a good. Firms would be willing to supply items as long as the price they receive for the good exceeds the cost of producing it. If the price they received for the good was below the cost of producing it, then the firm will lose money by producing it. Firms with low costs have the ability to supply goods even when the price is low.

Since we assume there is only one market price for a good, all sellers receive this price regardless of their actual cost of production. Some firms, because they had low costs, might have been willing to sell the product at a lower price than the market price. The fact that these suppliers receive a higher price than the minimum they would have been willing to accept will gain some surplus as a result. We formally define **producer surplus** as the difference between what a seller actually can get for their product and the cost of production.

Figure 3 shows the supply curve for the Harry Potter DVDs. Some manufacturers are very efficient and have low costs and can supply the DVDs even if the price was low. In Figure 3 we see that if the market price of DVDs was $2 there will be no market supply. At $2 per DVD the market price is so low that it doesn't cover the production costs for any firms who produces DVDs. However, if the price is $4 per DVD, there will be some firms who would be able to supply some DVDs at this price due to their low production costs.   In this example, if the price was $4, 200 DVDs would have been supplied. However, suppose that the market price in the economy for the DVDs was at $20. All the producers who could have supplied it at a lower price than $20 would benefit. This is represented by the red triangle in Figure 3. In this case producer surplus is equal to (1/2 x $18 x 1000) = $9000

Producer surplus will be measured as the area above the supply curve but below the price received by sellers.

Figure 3: Producer Surplus

We saw in lower prices will make consumers better off. Similarly, we would expect that higher prices would make sellers better off than before. We can quantify this using the concept of producer surplus. Consider Figure 4 which shows what would happen to producer surplus if the market price that sellers received increased to $25. We can easily calculate producer surplus to be the area above the supply curve and below the price line. For this example, the area will equal (1/2 x $23 x 1250) = $14375, which is clearly greater than the consumer surplus found when the price level was at $20.

Figure 4: Higher Prices leads to Higher Producer Surplus
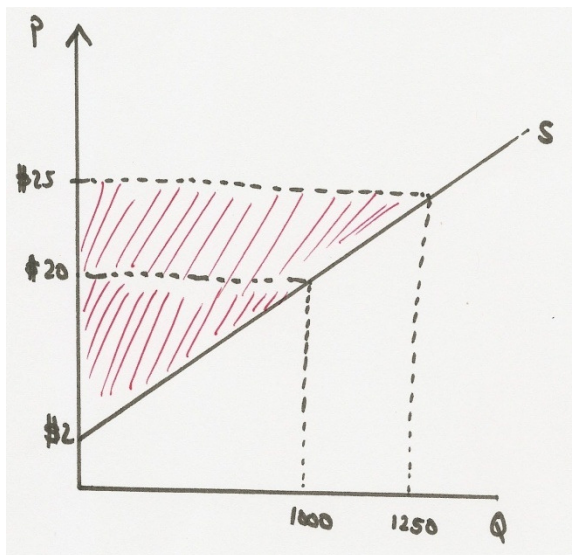
C. Market Efficiency

We've seen in our supply and demand graphs that eventually the market for any good will reach a market equilibrium. At this market equilibrium, the good will sell for a certain price and a certain output level will be produced and consumed. The question we turn to in this section is whether or not this equilibrium output level is "socially efficient".

What do we mean my efficiency? Let us assume we lived in a society where output levels are not decided by supply and demand but by a benevolent social planner (the way Communism was supposed to work). The social planner's goal is to try to choose an output level that will maximize the total welfare (or well-being) for society. Let's assume that there are only two groups of people in this society: consumers and firms. If this is true, then in order for the social planner to maximize total welfare for society, he/she should maximize the sum of consumer and producer surplus. This concept of producer surplus plus consumer surplus is known as **total surplus.**

Let's review some definitions:
Consumer surplus = Amount consumers are willing to pay – Amount consumers actually paid
Producer surplus = Amount producers actually receive – Cost of production
Total surplus = Consumer Surplus + Producer Surplus

When total surplus is at its maximum this is known as **economic efficiency.** The figure below show that total surplus is Area A + Area B. Area A is the measure of consumer surplus and Area B the measure of producer surplus. The total area is equal to $44,000.

Figure 5: Total Surplus
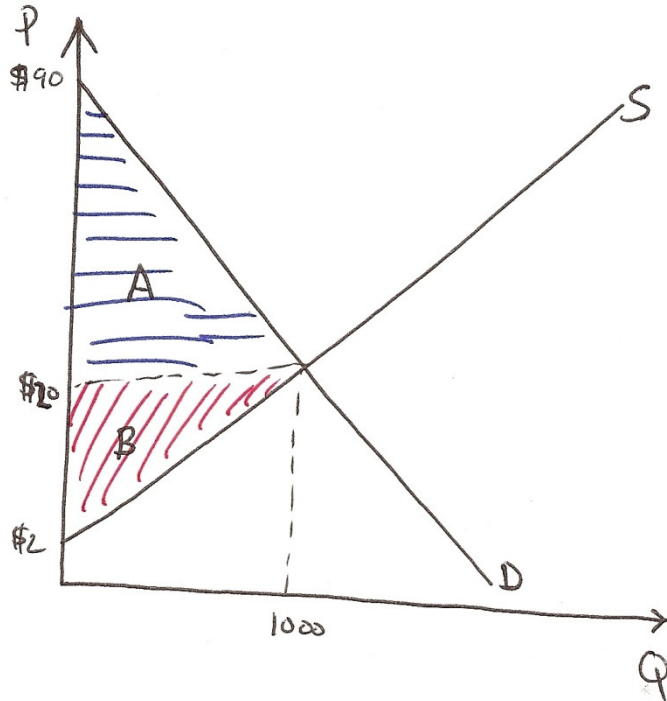
Note that the market equilibrium will result in a total of 1000 DVDs being produced which will result in a total surplus of $44,000.

Key Point: Market equilibrium output will maximize total surplus (result in market efficiency). No other level of output will result in a higher level of total surplus.