

Microeconomics

Topic 8 “Apply principles of consumer/producer surplus to explain efficient level of production and sales in a market.”

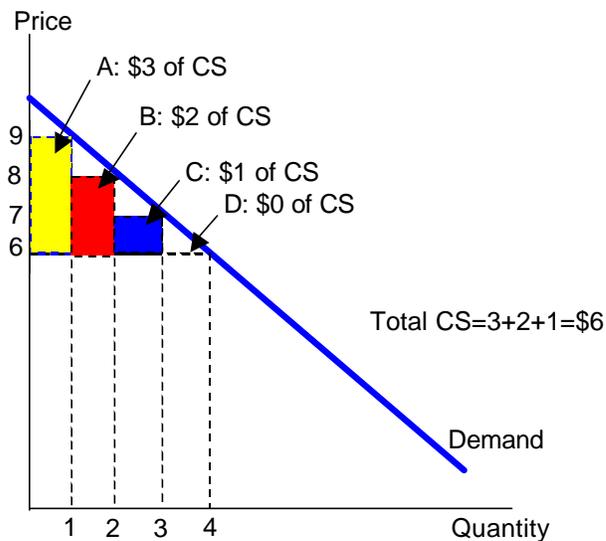
Reference: Gregory Mankiw’s *Principles of Microeconomics*, 2nd edition, Chapter 7.

Consumer Surplus

Consumer surplus is the buyer's net gain from purchasing a good. Put another way, it is the excess of what a buyer would have been willing to pay for a good over what he actually had to pay for that good. Graphically, it is the area below the demand curve, above the price, and left of the quantity bought.

For example, you might be willing, if you had to, to pay \$20 to make an important phone call. If the price you actually have to pay for that phone call is \$1, then you earn consumer surplus of \$19 when you make the call.

Figure 2.1



In figure 2.1, we suppose there are 4 consumers: A, B, C, and D. A is willing to pay \$9 for one unit of the good. B will pay \$8, C will pay \$7, and D will pay \$6. If the market price of the good is \$6 per unit, then A earns consumer surplus of \$3, since he was willing to pay \$9, but only had to pay \$6. Similarly, B earns \$2 of consumer surplus (CS), and C earns \$1 of CS. Customer D, the so-called "marginal" consumer, is willing to pay \$6 for a unit, but since the market price is \$6, D gets no consumer surplus.

In practice, consumer surplus is pictured as in figure 2.2, as the area below the demand curve, above the price, and left of the quantity bought.

Figure 2.2

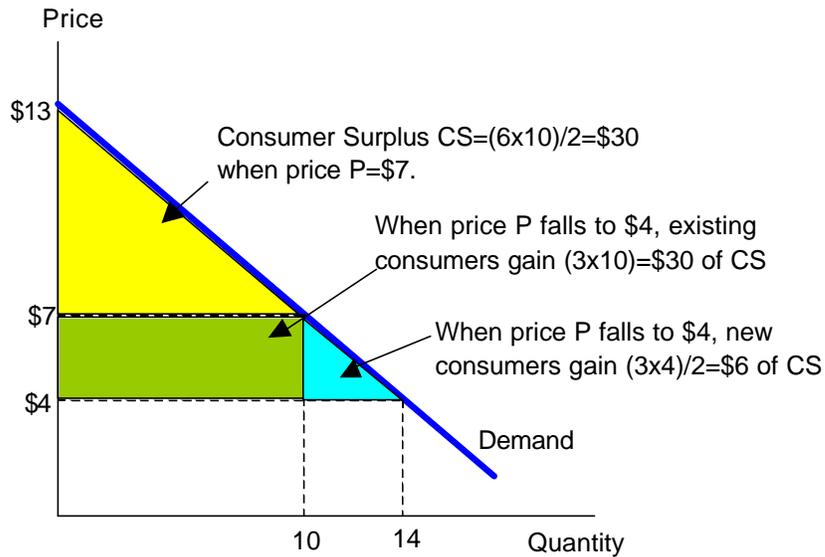


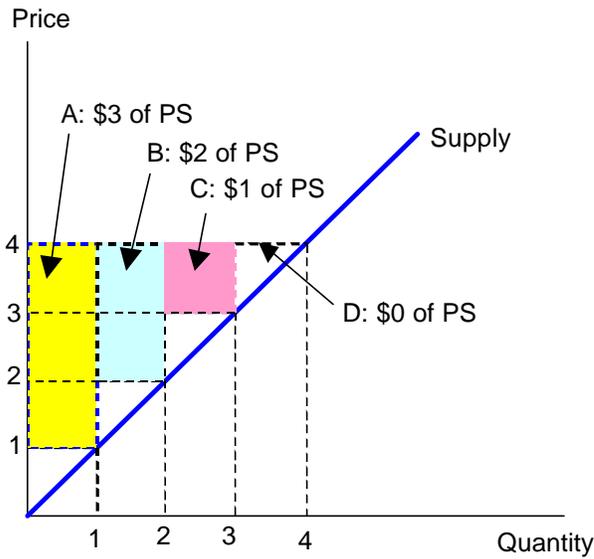
Figure 2.2 shows that when price is \$7, consumer surplus is \$30 (the yellow area). If the price falls to \$4, existing consumers save \$3 per unit on the 10 units they were already buying, for a gain of \$30 (green) in consumer surplus. In addition, 4 more units are sold to buyers who wouldn't have wanted the good for \$7, but who do want it for \$4. These buyers gain \$6 (blue) of consumer surplus when price falls from \$7 to \$4.

Producer Surplus

Producer surplus is the seller's net gain from selling a good. Alternatively, we could say it is the excess of what a seller is paid for a good above what he would have barely been willing to accept for it. Graphically, it is the area above the supply curve, below the price, and left of the quantity sold.

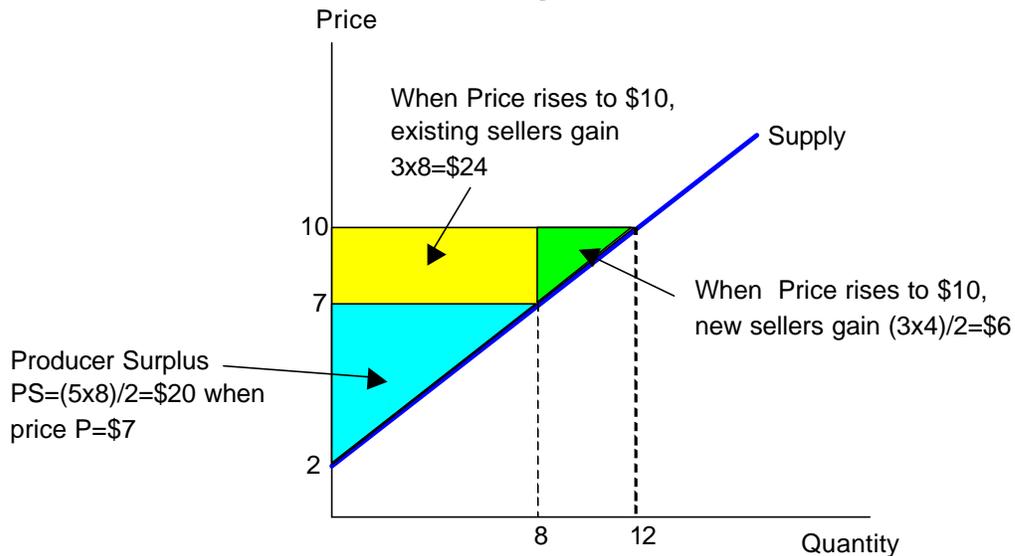
Example: A seller sells a good for a price of \$7. It costs him \$4 to produce the good, so \$4 is the lowest price he would be willing to accept. He earns producer surplus of \$3.

Figure 2.3



In Figure 2.3, we imagine 4 sellers: A, B, C, and D. A would barely be willing to sell a unit of the good for \$1, but if the going price of the good is \$4, A earns producer surplus (PS) of \$3. B would sell for \$2, but since he charges \$4 he earns PS of \$2. C earns PS of \$1, while D, the “marginal” seller, earns zero PS, since he is barely willing to sell for the going price of \$4.

Figure 2.4



In Figure 2.4, we see that at a price of \$7, producer surplus is \$20 (blue). If the price rises to \$10, then existing sellers gain $(3 \times 8) = \$24$ each (yellow), while new sellers gain $(3 \times 4) / 2 = \$6$ (green).

The Efficient Level of Production in a Market

The efficient level of production is the quantity of output that results in the highest total surplus, which is the sum of consumer surplus and producer surplus.

Figure 2.5

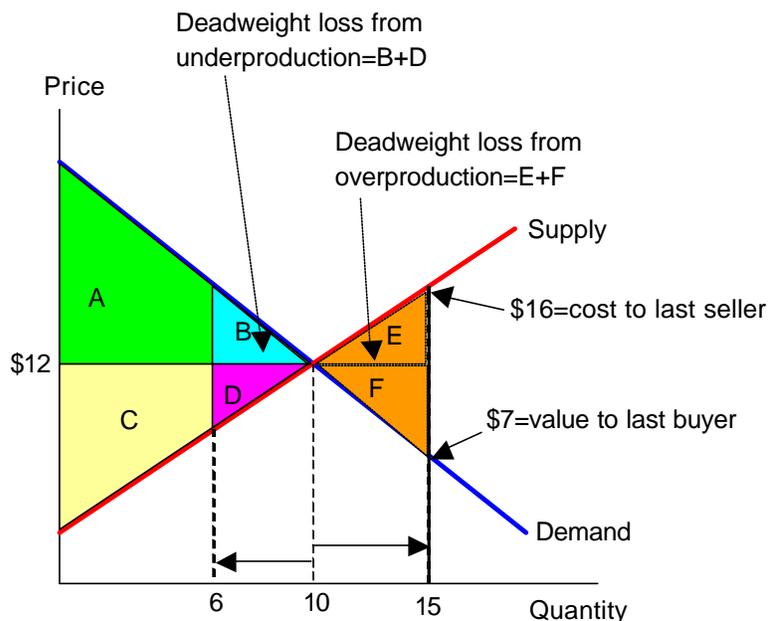


Figure 2.5 shows the relative efficiency of different levels of production. At the equilibrium output of 10 units, consumer surplus is given by areas A + B (green + blue). Producer surplus is given by areas C+D (yellow + purple).

Now suppose that output is reduced from 10 to 6 units, while the price remains the same. Consumer surplus is reduced to area A. (Recall that CS is the area below demand, above price, and left of the quantity bought.) Similarly, producer surplus is reduced to area C. Thus, total surplus is reduced to area A+C, and society suffers a deadweight loss equal to B+D (blue+purple), which is the loss in total surplus when production falls below the equilibrium quantity.

Conclusion: the equilibrium output level is economically superior to any lower output level. Producing less than the equilibrium quantity is inefficient because total surplus is reduced. Put differently, at output levels below equilibrium, consumers' willingness to pay for an extra unit of the good exceeds the sellers' cost of producing an extra unit of the good. So from a welfare standpoint, more of the good should be produced.

It is also possible to produce too much. Suppose that output rises from 10 to 15. At $Q=15$, the height of the demand curve is \$7, while the height of the supply curve is \$16. This means that it costs \$16 to produce a unit that buyers value at only \$7. The 15th unit thus created a loss of $(16-7)=$9$. Consumer surplus falls by the area F --where the price of \$12

is above their willingness to pay for an extra unit of the good-- and producer surplus falls by the area E --where the price of \$12 lies below their cost of producing an extra unit of the good. The deadweight loss of the excess production is measured by areas E+F (orange), which is the loss in total surplus when production rises above the equilibrium quantity.

Conclusion: the equilibrium output level is economically superior to any higher output level. Producing more than the equilibrium quantity is inefficient because total surplus is reduced. Put differently, at output levels above equilibrium, the sellers' cost of producing an extra unit of the good exceeds consumers' willingness to pay for an extra unit of the good. So from a welfare standpoint, less of the good should be produced.