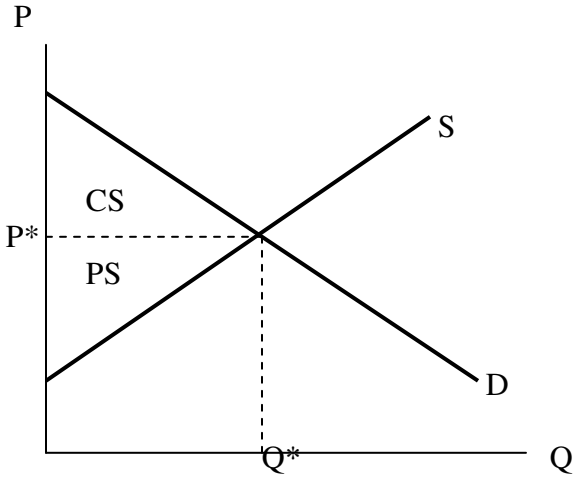
Chapter 9: Analysis of Competitive Markets

Having developed our model of perfect competition, which gave us a nice, normal-looking supply curve to go with the upward-sloping demand from Chapter 4, we now return to supply-and-demand to see how various government policies influence the efficiency of perfectly competitive markets.

As we study efficiency here, we will focus on producer and consumer surplus. The sum of PS and CS is sometimes called total surplus (TS) and represents all gains reaped by buyers and sellers.

Perfect Competition is Efficient

One of the reasons why economists like perfect competition so much is that it maximizes total surplus.



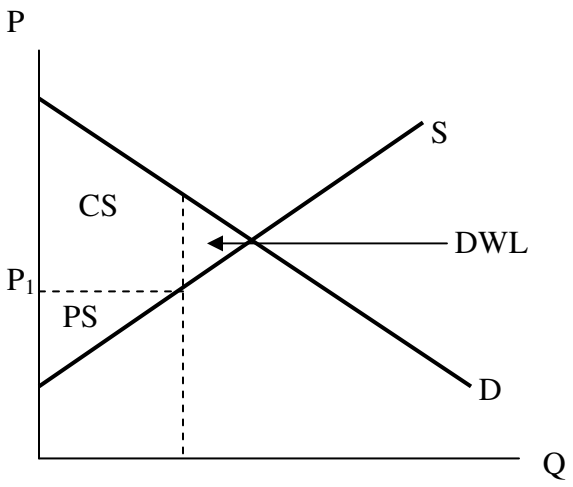
This diagram shows PS and CS in a perfectly competitive market. TS is given by the sum of CS and PS, the large triangle formed by the choke prices and market quantity. You should be able to verify that if P were anything other than P*, TS would be smaller.

The reason for this is that if P were not P*, Q would fall. If P is too high, consumers buy less than Q*. If P is too low, firms produce less than Q*. In either case, the short side of the market dominates, and Q drops, leading to a decline in total surplus and a deadweight loss (a net loss in total surplus).

Price Ceilings and Price Floors

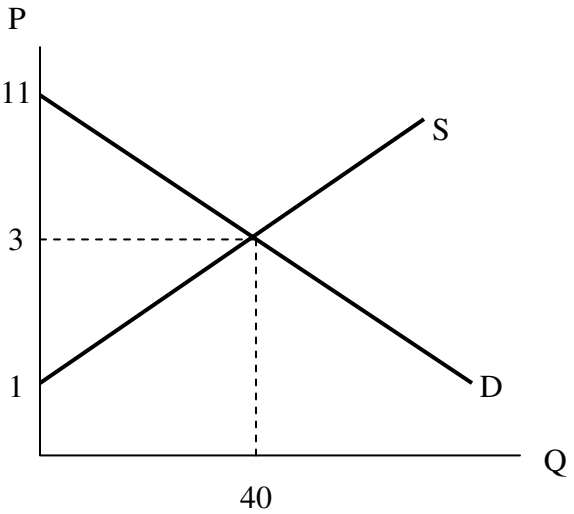
To see this, consider what happens when the government imposes a price either above or below the competitive, market-clear price.

Example: A price ceiling. Suppose the government imposes a price ceiling on gasoline. This would lead to a gas shortage, as shown below:



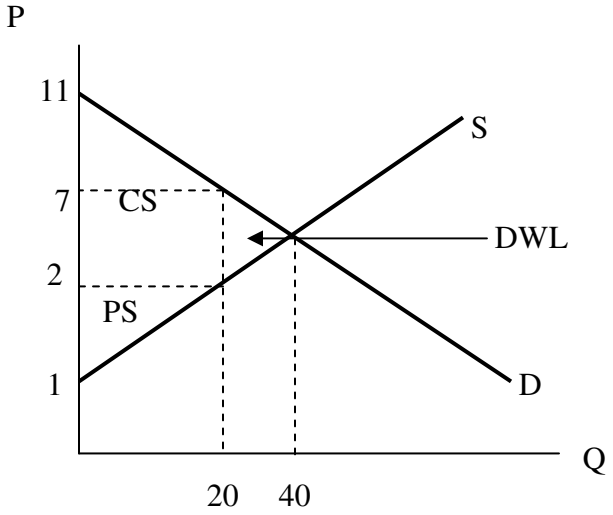
Here the government has lowered the price of gasoline. This obviously reduces PS since gas companies now produce less gasoline and get a lower price for it. CS appears to have gone up (although gas sales have dropped, meaning that some consumers who were willing to buy gas at the previous market-clear price no longer do so). However, TS has clearly fallen. The deadweight loss is indicated above.

Suppose the supply of gasoline is given by $Q^S = 20\ P - 20$, and demand is $Q^D = 55 – 5P$. Then P* = \$3 and Q* = 40. Also, you should be able to calculate the choke prices. For demand, the choke price is \$11, and for supply it is \$1. (At these prices, Q^D and Q^S are equal to zero, respectively). Thus we have



Since the area of a triangle is ½(bh), CS = ½(8)(40) = 160
PS = ½(2)(40) = 40
TS = 200

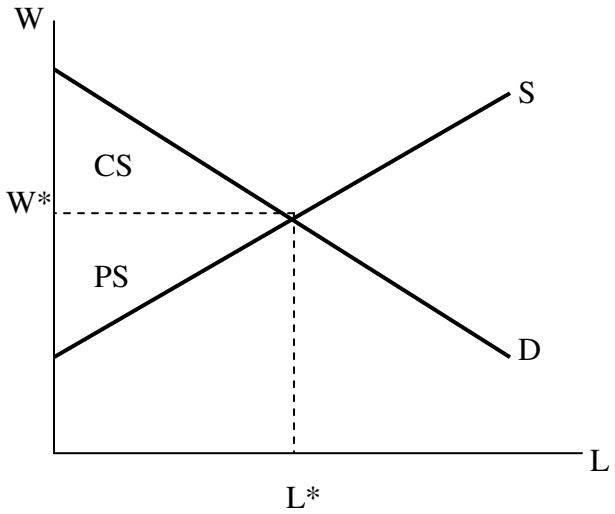
Now suppose the government imposes a price ceiling of \$2. This reduces Q^S to 20, giving us the following:



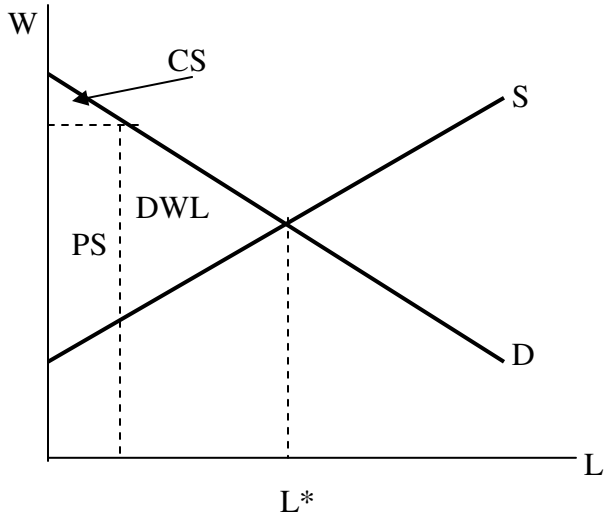
PS drops to 10. The deadweight loss is ½(20)(5) = 50. Thus, since TS was originally 200, and will now be 150, if PS is 10, CS is 140. Note that CS actually *fell* here. Apparently, the loss caused by being able to buy less gas outweighed the positive effect of lower prices.

Example: The Market for Organs (in book).

Example: Minimum Wage. When the government artificially raises the wage of unskilled labor, it reduces the quantity demanded, creating a deadweight loss.



This is our initial market for unskilled labor. Notice that CS is surplus earned by buyers (in this case, firms), while PS is surplus earned by sellers (in this case, workers). If the government imposes a minimum wage of W_1, we get the following:

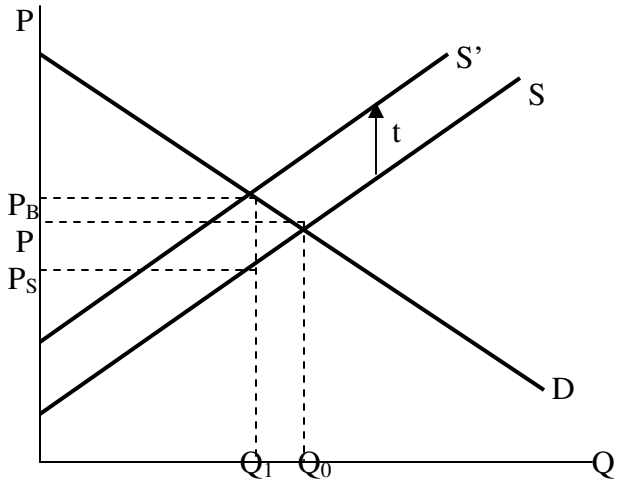


The labor surplus leads to a deadweight loss. Obviously CS will drop since firms hire less labor and pay more for it. Two effects are at work on PS – those workers who still have jobs earn more (causing PS to rise), but some workers lose their jobs (causing PS to fall). PS could either rise or fall depending on the relative magnitudes of these effects.

Taxes and Subsidies

Sometimes the government influences the price of a good by imposing a tax or subsidy on it. To keep things simple, we will consider what P&R call a specific tax, which is a tax of a certain amount of money per unit of the good sold. This is sometimes called a "per-unit" tax. Let this tax be denoted t.

First, let us simply examine what the imposition of this tax does to the market. Suppose that the firm must pay this tax on each unit of output before it can ship the good to market. In that case, the firm's MC has increased, causing S to shift up by the amount of the tax.



Notice that in order to induce firms to produce the same quantity, price must rise by exactly the amount of the tax, so that the price received by firms (P_S) remains unchanged. However, P does not rise by the full amount of the tax. Instead, it rises only to P_B, which is the price paid by buyers of the product.

The tax drives a wedge between the price paid by buyers and the price received by sellers. You can see from the graph that $P_B - P_S = t$, which should be unsurprising.

You can also see from the diagram what happens to CS and PS. CS falls from the triangle formed by the demand choke price, P and Q_0 to the triangle formed by the demand choke price, P_B and Q_1. This is a clear reduction in CS since the base and height of the triangle both fell.

PS falls from the triangle formed by the supply choke price, P and Q_0 to the triangle formed by the supply choke price, P_S and Q_1. Again, the base and height of this triangle are both lower, so PS has fallen.

It is important to note that the government is getting tax revenue out of this, and this revenue should be counted as part of TS. Thus, in the case of a tax, we can write

$$TS = PS + CS + \text{Tax Revenue}$$

Here, the tax revenue is tQ_1, or the rectangle formed by P_S, P_B and Q_1.

The deadweight loss is therefore the triangle formed by Q_1, Q_0, P_B and P_S.