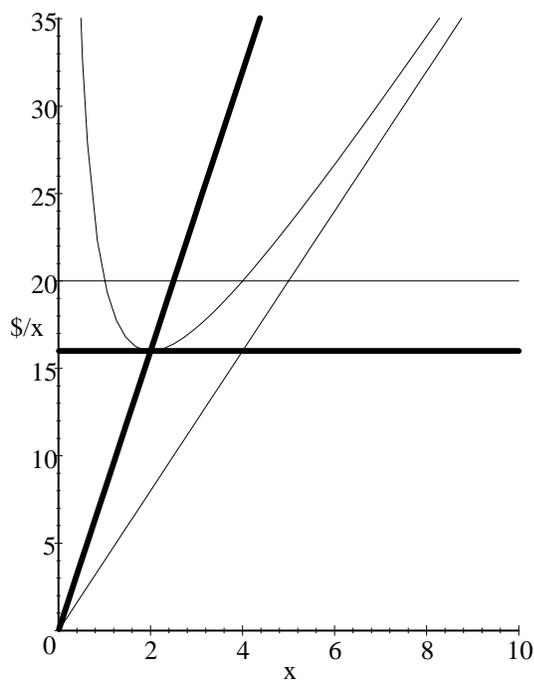
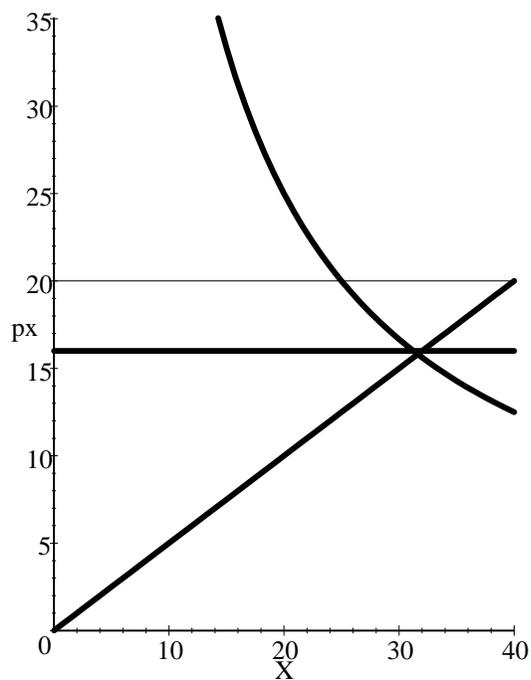


## What Happens when the Environment Changes: Comparative Statics Analysis

Consider the market for gas powered chainsaws, originally in long run and short run equilibrium at  $p_x = 16$  and  $X^d = 32$ .

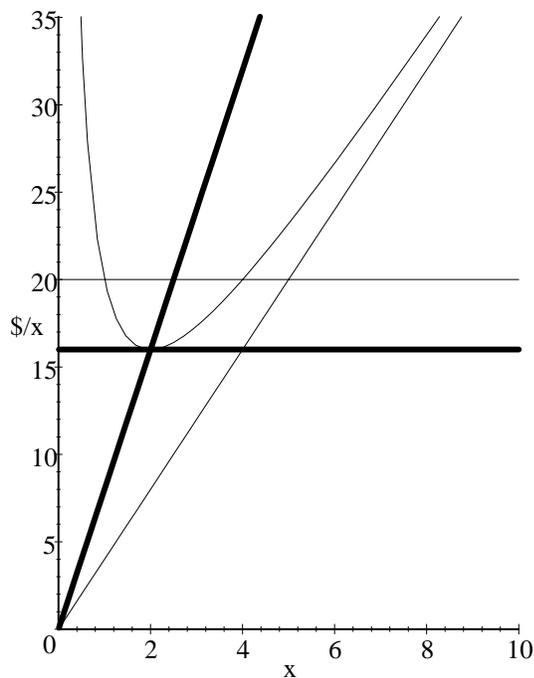


Firm's Supply Curve

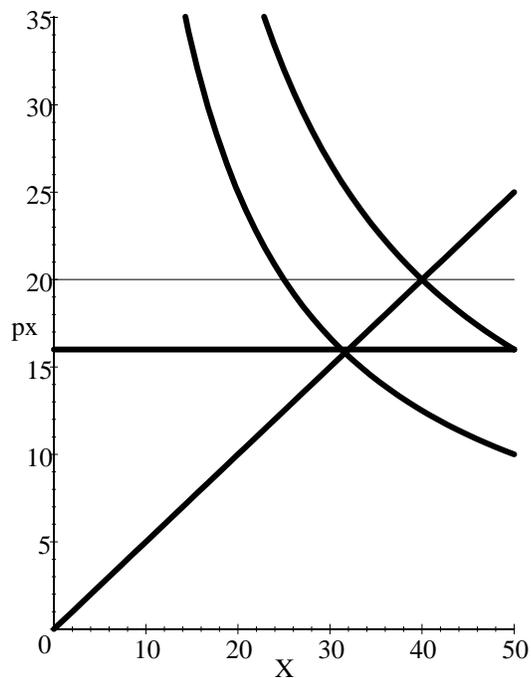


Market Supply Curve

Now suppose a hurricane strikes, increasing the demand for gas powered chainsaws. Suppose also that firms' short run marginal costs are unchanged. (In the very short run aftermath, it may be very costly to access this market, so the supply curve might shift up, and things might be even worse.)



Firm's Supply Curve



Market Supply Curve

In the short run, the price increases from 16 to 20, and the quantity increases from 32 to 40. The price increases for chainsaws already in inventory. No one has any market power, so this is not gouging! Firms receive economic profits. We are not in long run equilibrium any more.

As entry becomes possible, new firms will enter the market, and the price will fall to 16. Think of an immediate jump to the new short run equilibrium ( $X = 40, p_x = 20$ ), followed by a gradual movement along the new demand curve as entry occurs and we move through a sequence of short run equilibria. Finally, at the new long run equilibrium, there will be a short run supply curve going through ( $X = 50, p_x = 16$ ).

As the crisis abates, the demand curve might even shift back to the original one.

During the increase in crude oil prices following hurricane Katrina, it was not suspicious that prices at the pump increased immediately. Replenishing supplies became more expensive, which introduced an opportunity cost and increased marginal cost of selling existing inventories. When Congress held hearings about the price runup following the summer 2000 hurricanes, the sharp drop in prices after the announcement of Congressional hearings was suspicious.

## Consumer and Producer Surplus

The height of the (inverse) demand curve at a particular quantity,  $X$ , is the price that some consumer is willing to pay for that unit of output. It is the market's *marginal willingness to pay or marginal benefit* to society of consumption.

That individual consumer receives a surplus equal to her willingness to pay minus the price she pays. (Think back to our market experiment.)

For simplicity, suppose all consumers pay the same price. The total *consumer surplus* is the sum of the surpluses generated by all  $X$  units, which is the area below the demand curve and above the price line, over the range from 0 to  $X$ .

The height of the (inverse) supply curve at a particular quantity,  $X$ , is the price at which some firm is willing to sell that unit of output. Since it also is the marginal cost of production for the firm selling the output, the height up to the supply curve is society's *marginal cost* of providing the consumption.

That individual firm receives a surplus from that unit equal to the price received minus the marginal cost of production. (Think back to our market experiment.)

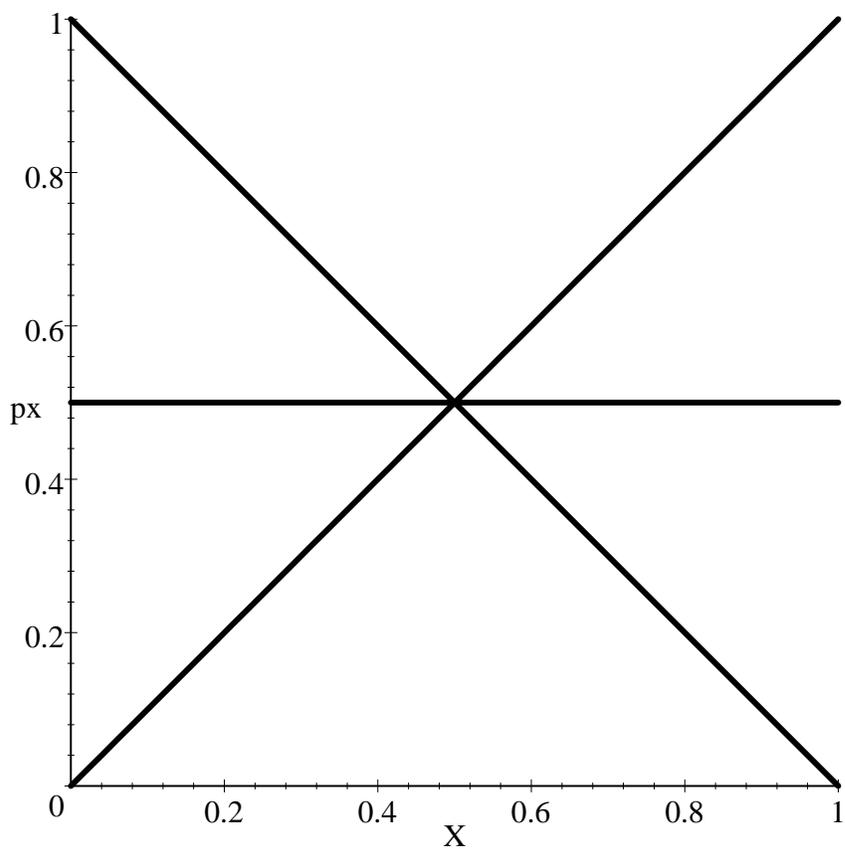
The total *producer surplus* is the sum of the surpluses generated by all  $X$  units, which is the area below the price line and above the supply curve, over the range from 0 to  $X$ .

The total benefit to society of  $X$  units of output is the sum of the consumer surplus and the producer surplus. We care about producer surplus, because it represents the additional profits received by the owners of the firms.

$$\begin{aligned}\text{Total Surplus} &= \text{Cons. Surplus} + \text{Producer Surplus} \\ &= \int [(\text{Value} - \text{price}) + (\text{price} - \text{cost})] \\ &= \text{Value to buyers} - \text{Cost to sellers.}\end{aligned}$$

To choose the output that maximizes the total benefit to society (net of costs), we want the marginal benefit to consumers to equal the marginal cost of production. This is exactly where the demand curve and the supply curve intersect.

Thus, efficiency requires the output to be where the demand and supply curves intersect. It also requires the consumption to be done by the consumers with the highest willingness to pay, and the production to be done by the firms with the lowest costs. A market system yields an efficient outcome.



### Consumer and Producer Surplus

Comparing  $X = .2$ ,  $X = .5$ , and  $X = .8$ , the highest total surplus occurs at  $X = .5$ .