UC Berkeley
Haas School of Business
Economic Analysis for Business Decisions
(EWMBA 201A)

Monopoly and Market Power

Session V

Sep 18, 2010

Monopoly

- In contrast to perfect competition, a **monopoly** is a market that has only one seller but many buyers.

- A **monopsony** is exactly the opposite – is a market that has many sellers but only one buyer.

- Monopoly and monopsony are forms of **market power** – an ability to effect the market price.

- Our goal is to understand how market power works and how it effects producers and consumers.

The theory of monopoly is, on the face of it, simple and straightforward, but behind it lie some deep and interesting questions.

[1] How the monopoly came to be a monopoly, and why it stays that way?

[2] If the monopoly makes profit, why does not the industry attract entrants?

Standard stories, if given at all, get very fuzzy at this point. Hands start to wave, hems give away to haws, and on to the next subject...

Perhaps most importantly, the monopolist is the market so it completely controls the amount of output offered for sale (or the price per unit).

– When the monopolist decides how much to produce, the price per unit that it receives follows directly from the market demand.

– When the monopolist determines a price, the quantity it will sell at that price follows from the market demand.

The standard theory is that the monopoly set a quantity of output $Q \geq 0$ to maximize its profits (but we can also think of the monopoly choosing a price p).

Average revenue and marginal revenue

The monopolist's *average revenue* – the price it receives per unit sold – is the market demand curve.
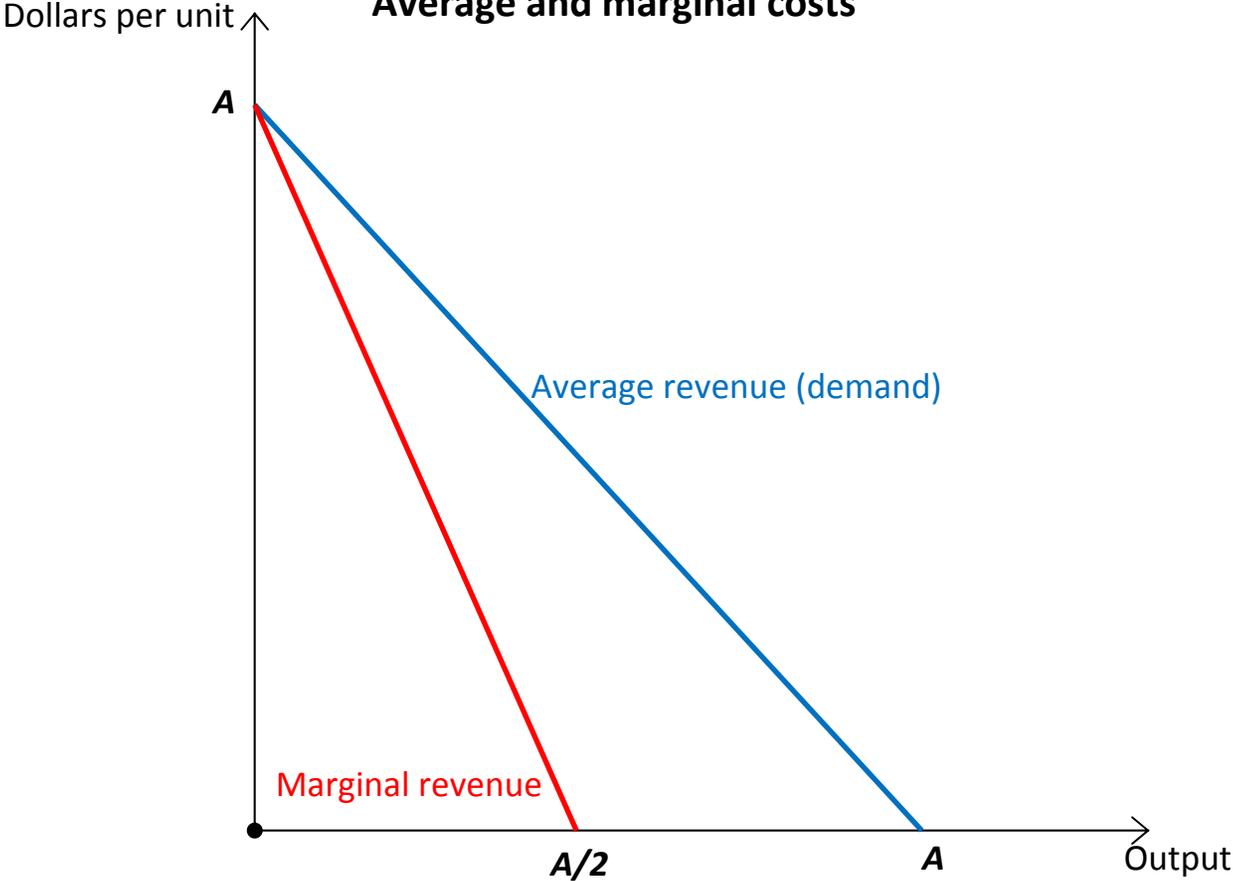
To see the relationship among total, average, and marginal revenue, consider a monopolist facing a linear demand curve

$$P(Q) = A - Q \text{ where } A > 0.$$

Then,

$$R(Q) = P(Q)Q = AQ - Q^2 \qquad MR = \Delta R/\Delta Q = A - 2Q.$$

Average and marginal costs

Dollars per unit

A

Average revenue (demand)

Marginal revenue

A/2   *A*   Output

The monopolist's output decision problem

The monopolist's profit $\pi(Q)$ is the difference between revenue and cost

$$\pi(Q) = R(Q) - C(Q),$$

both of which depend on Q.

As Q increases, π will increase until it reaches a maximum and then start to decrease.

Hence, the profit-maximizing quantity of output Q^* is such that the marginal (incremental) profit resulting from a small increase in Q equals zero.

Algebraically,

$$\Delta\pi/\Delta Q = \Delta R/\Delta Q - \Delta C/\Delta Q = 0,$$

or equivalently,

$$\Delta R/\Delta Q = \Delta C/\Delta Q.$$

That is, we have the slogan that *marginal revenues MR equals marginal costs MC.*

An example

Suppose the cost of production is given by

$$C(Q) = 50 + Q^2$$

(a fixed costs of \$50 and a variable costs of and variable costs of Q^2)
the demand is given by

$$P(Q) = 40 - Q.$$

Note well that

$$AC = C(Q)/Q = 50/Q + Q \qquad MC = \Delta C/\Delta Q = 2Q$$

$$R(Q) = P(Q)Q = 40Q - Q^2 \qquad MR = 40 - 2Q$$

Setting marginal revenue equal to marginal cost $MR = MC$ gives

$$40 - 2Q = 2Q,$$
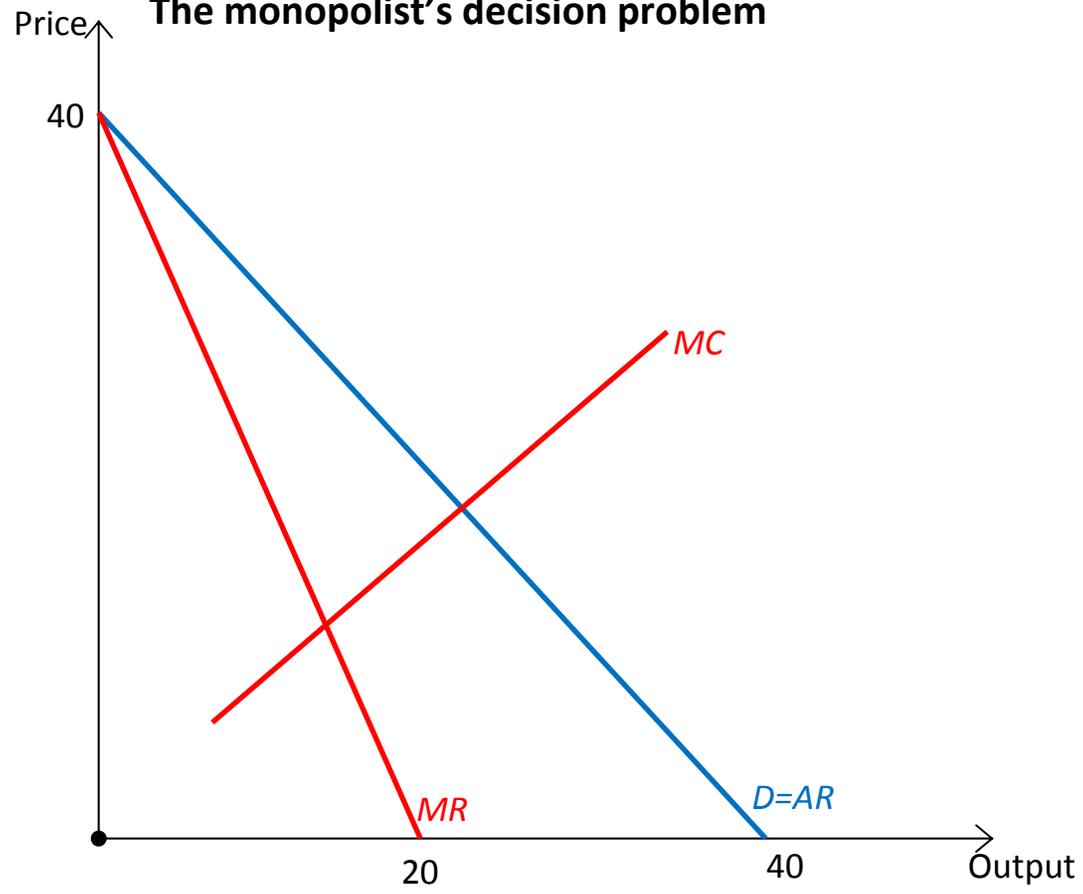
or $Q^* = 10$ (reaching the maximum profit of \$150).
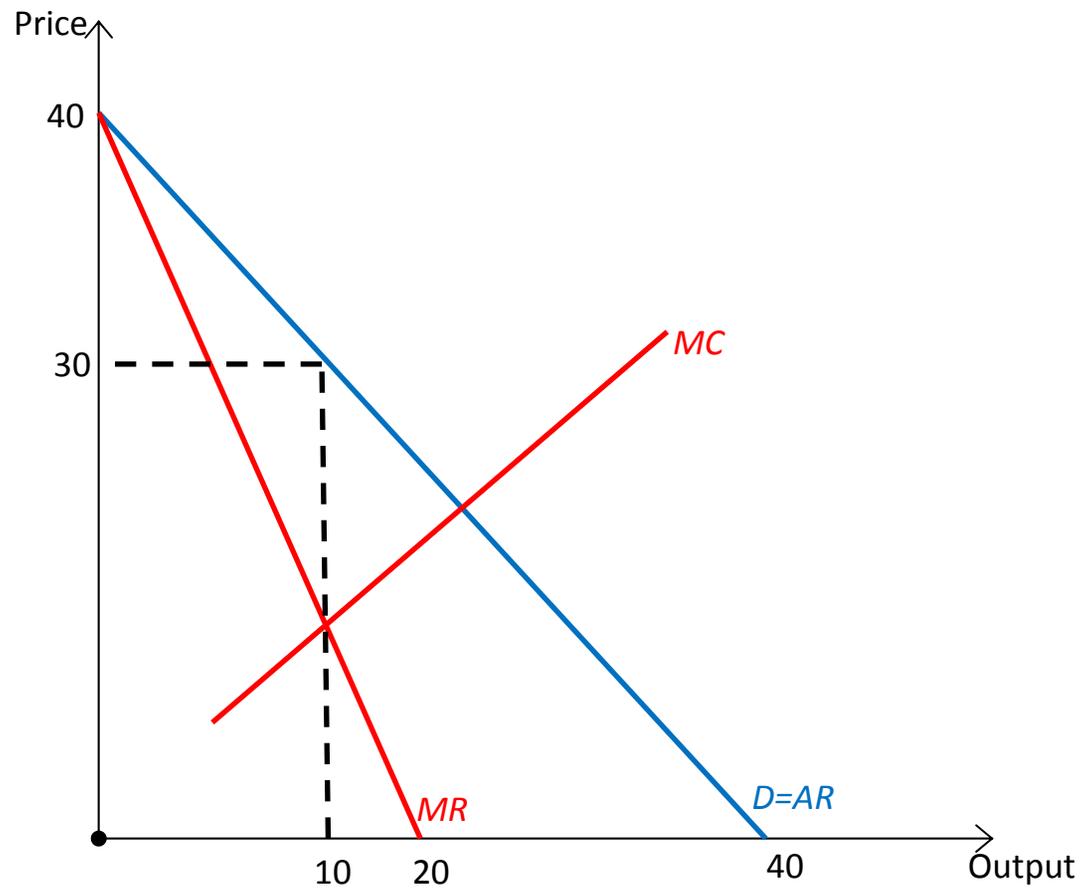
Alternatively,

$$
\begin{aligned}
\pi(Q) &= R(Q) - C(Q) = P(Q)Q - C(Q) \\
&= (40 - Q)Q - 50 - Q^2 = 40Q - Q^2 - 50 - Q^2 \\
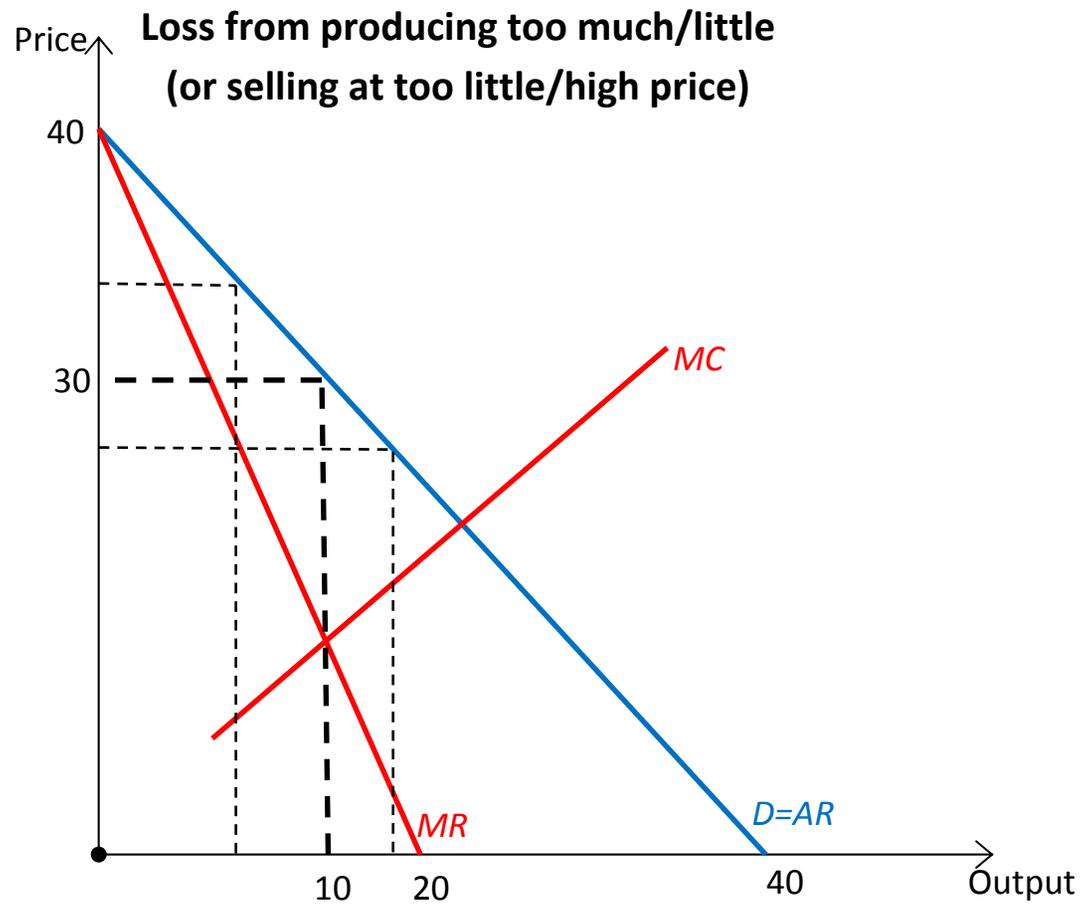&= 40Q - 50 - 2Q^2.
\end{aligned}
$$

and setting $\Delta\pi/\Delta Q$ equal zero gives $40 - 4Q = 0$, or $Q^* = 10$.

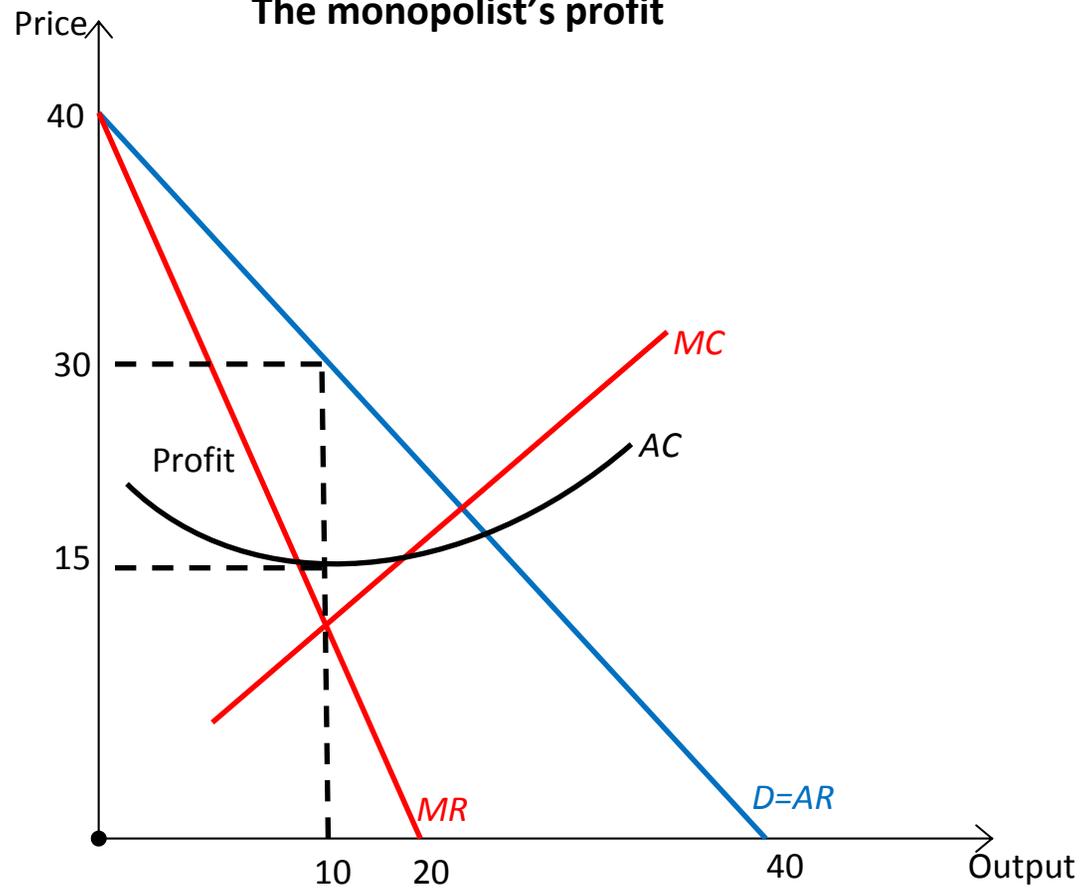Next we will give a geometrical procedure for doing this.

The monopolist's decision problem

Price

40

MC

MR

D=AR

20

40

Output

Loss from producing too much/little (or selling at too little/high price)

Price

40

30

MC

D=AR

MR

10   20

40

Output

The monopolist's profit

Price

40

30

15

Profit

MC

AC

MR

D=AR

10   20   40   Output

The "rule of thumb" for pricing

But a lot is wrong with the story just told – managers have only limited information of the average and marginal revenue curves facing their firms. To this end, so we need a rule of thumb that can be applied in the real-world.

Note that selling an extra unit *must* result in a small drop in price $\Delta P/\Delta Q$ which reduces the revenue from *all* units sold! We therefore rewrite the marginal revenue as follows

$$
\begin{aligned}
MR &= P + Q\frac{\Delta P}{\Delta Q} = P + P\left(\frac{Q}{p}\right)\left(\frac{\Delta P}{\Delta Q}\right) \\
&= P + P\frac{1}{E_d}.
\end{aligned}
$$

Recall that the price elasticity of demand − the percentage change (decrease) in quantity demanded of a good resulting from a 1-percent increase in its price − is given by

$$E_d = \frac{\Delta Q/Q}{\Delta P/P} = \frac{P}{Q}\frac{\Delta Q}{\Delta P}.$$

When we set marginal revenues to marginal costs we get

$$MR = P + P\frac{1}{E_d} = MC.$$

Rearranging,

$$P = \frac{MC}{1 + (1/E_d)}.$$

Monopoly power?

For a competitive firm, price equals marginal costs; for a firm with monopoly power, price exceeds marginal costs.

The Lerner Index of Monopoly Power (1934) given mathematically by

$$L = \frac{P - MC}{P}$$
$$= -1/E_d$$

uses the markup ratio of price minus marginal costs to price to measure the monopoly power.

! Firms prices are sometimes below its optimal price so its monopoly power will not be noted by the Lerner Index.

Loss from monopoly power

A+B – Deadweight loss

C—loss consumer surplus

Price

40

30

C

A

B

MC

MR

D=AR

10   20

40

Output
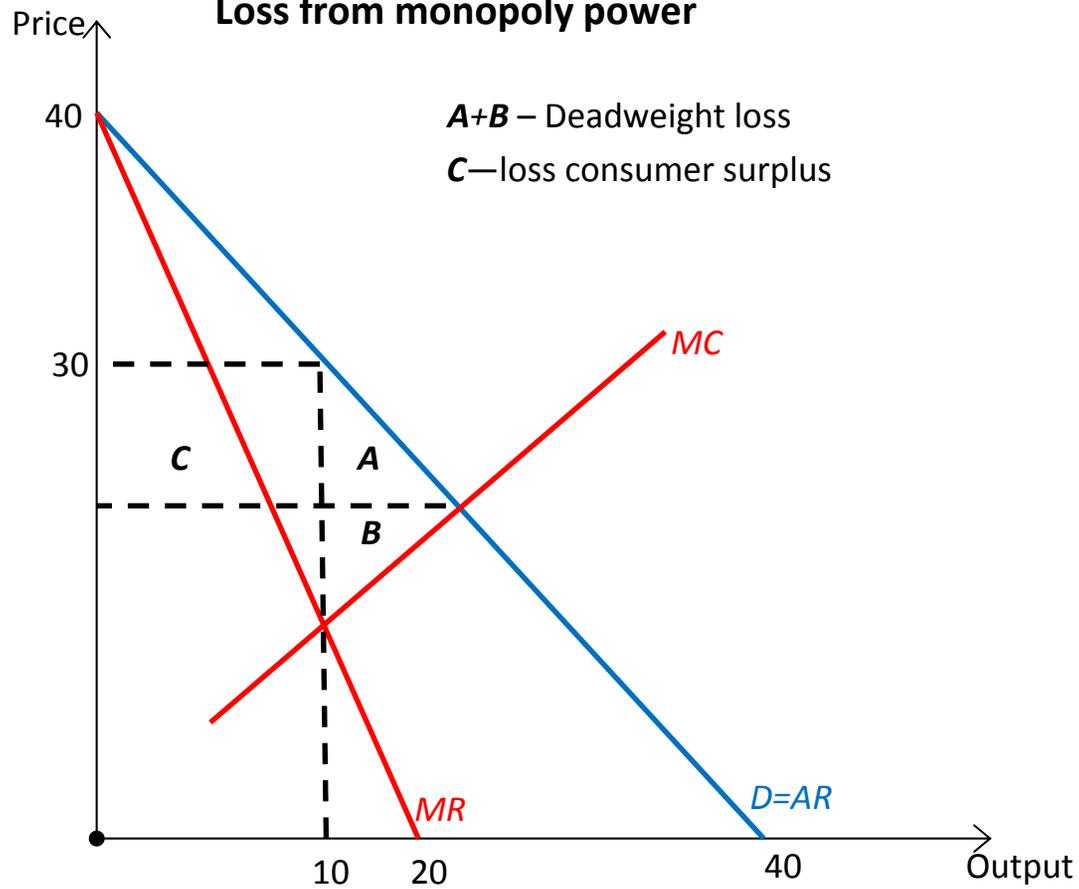
Sources of market power

The more inelastic its demand curve, the more monopoly power the firm has. These factors determine a firm's demand elasticity:

[1] The elasticity of market demand.

[2] The number of firms in the market.

[3] The interaction among firms.

Maintaining monopoly

$\Longrightarrow$ Differentiated / branded goods.

$\Longrightarrow$ Barriers to entry (e.g., patents).

$\Longrightarrow$ Customer lock-in.

$\Longrightarrow$ Predatory pricing.