Monopoly

Monopoly

Overview

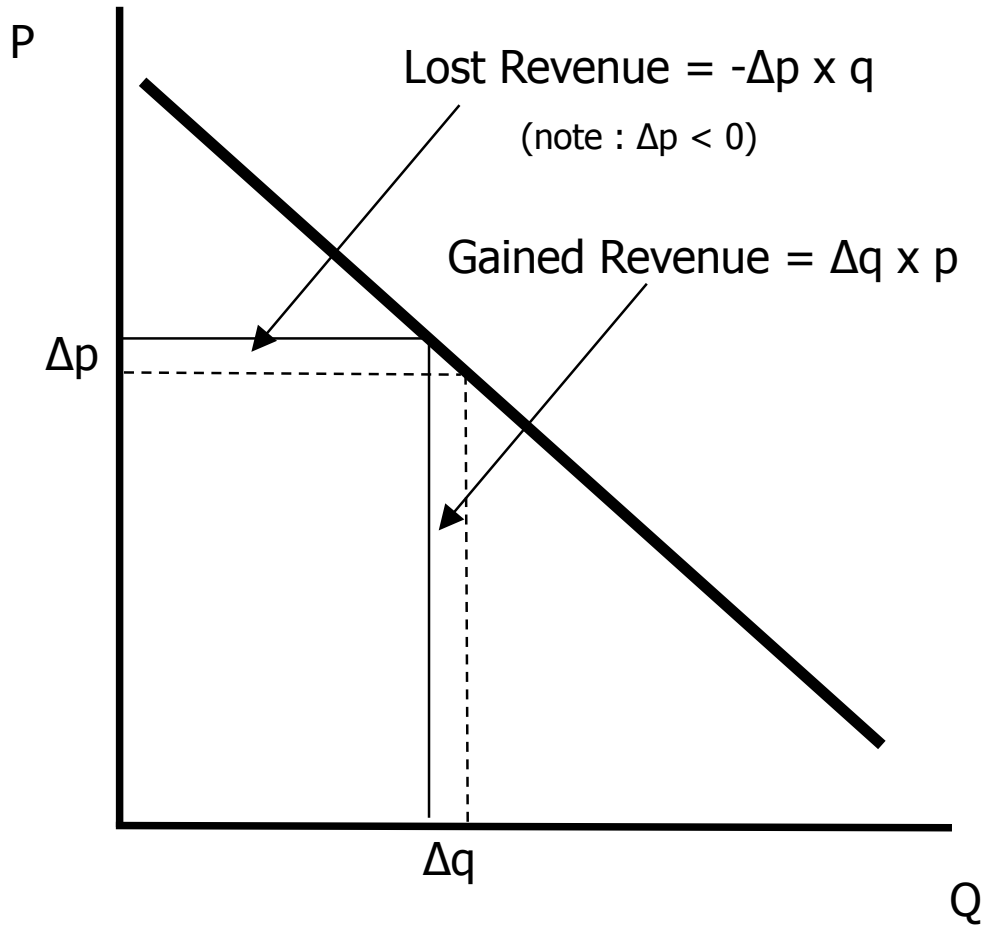
Definition: A firm is a monopoly if it is the **only** supplier of a product in a market. A monopolist's demand curve slopes down because firm demand equals industry demand.

Five cases:

1. Base Case (One price, perishable good, non-IRS Costs).
2. Natural Monopoly
3. Price Discrimination
4. Bundling
5. Durable Goods

Monopoly

Base case: Revenue



Monopoly

Base case: Revenue

Demand Curve Facing Monopolist (MC = 0). Decreasing price by Δp reduces revenue on the inframarginal unit, but increases revenue on the extra marginal unit.

Which revenue effect is larger?

Revenue $= P * Q$
Is the % decrease in P greater or less than the % increase in Q?

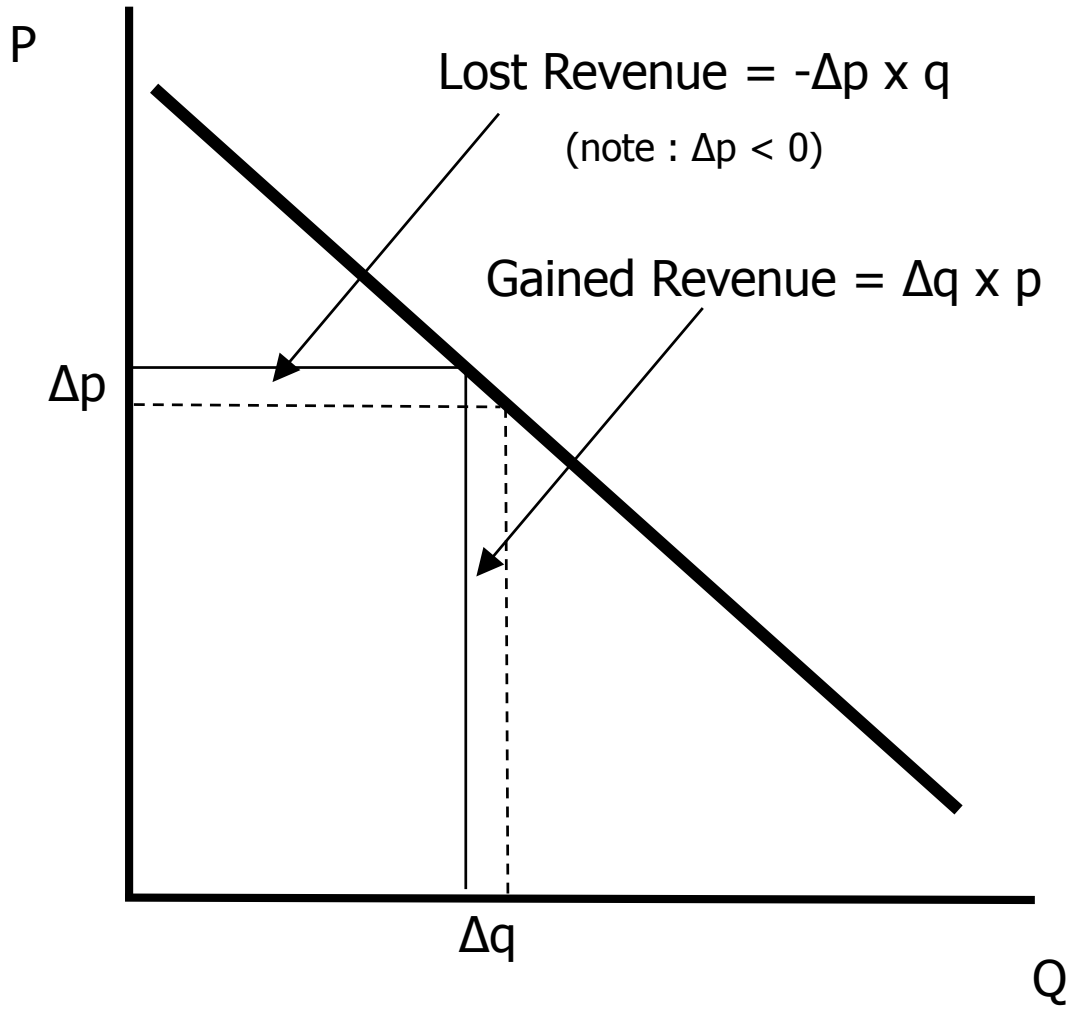
It depends on the price elasticity of demand:

$$\varepsilon_d = \frac{P}{Q}\frac{dQ}{dP}$$

Moving toward the point where $\varepsilon_d = -1$ increases total revenue.

Monopoly

Base case: Revenue



Given a price drop, revenue increases if

$$\text{Gain} > \text{Loss}$$

$$\Delta q \times p > -\Delta p \times q$$

$$p\Delta q > -q\Delta p$$

Which implies:

$$(p\Delta q)/(q\Delta p) < -1$$

$$\varepsilon < -1$$

Monopoly

Base Case: Linear Demand

What does Marginal Revenue look like? Denote the inverse demand curve by P(Q). We consider simple linear demand curves here:

$$Q = a - bP$$

$$\begin{aligned} P &= \frac{a}{b} - \frac{1}{b}Q \\ &\equiv A - BQ \end{aligned}$$

Total revenue is:

$$\begin{aligned} PQ &= (A - BQ)Q \\ &= AQ - BQ^2 \end{aligned}$$

Differentiate to get marginal revenue:

$$MR = \frac{dR}{dQ} = A - 2BQ$$

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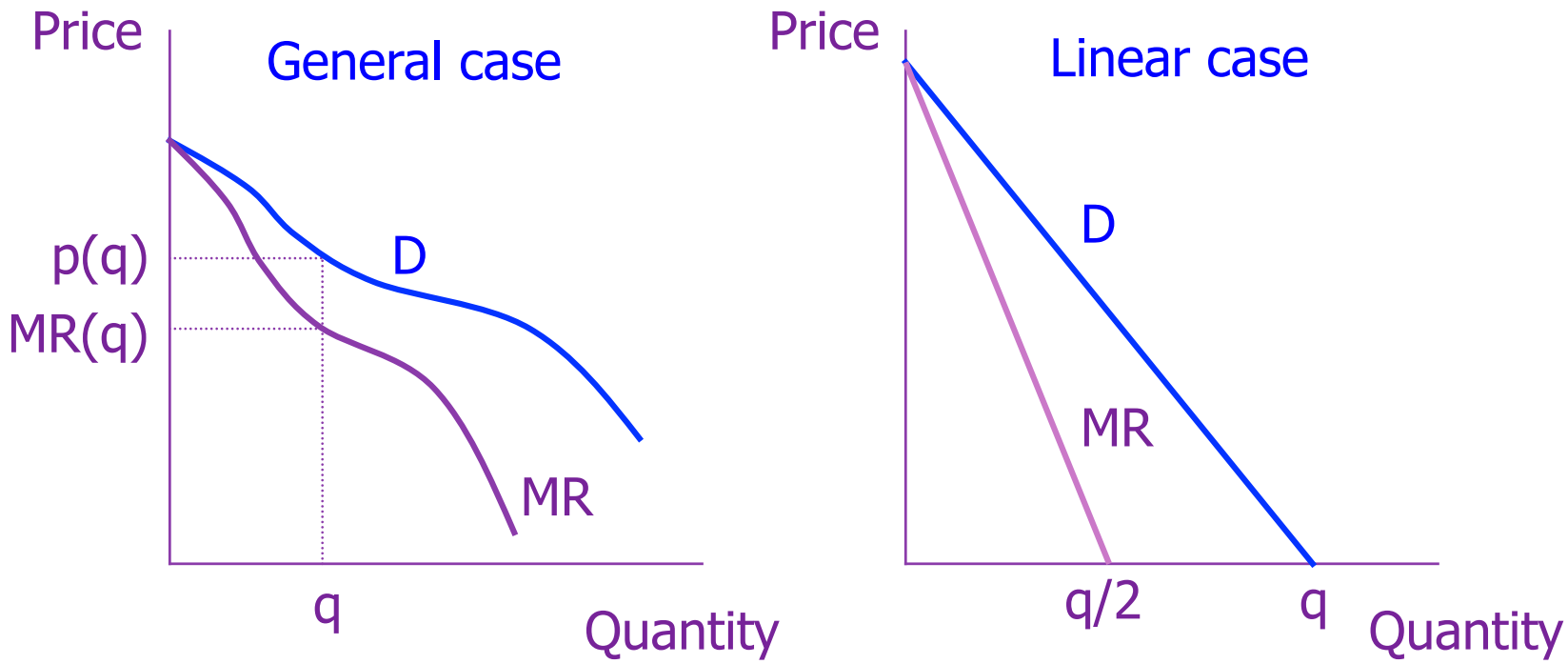
Base Case: Linear Demand



Marginal revenue is less than price

Monopoly

Base Case: Profit Maximization

Monopolist's Profit Maximization Problem:

$$\max_{Q} \pi = P(Q)Q - C(Q)$$

(Choosing P or Q makes no difference because we are selecting a single point on the demand curve. This will not be true when we consider oligopoly problems.)

F.O.C. are:

$$\frac{d\pi}{dQ} = P(Q) + Q\frac{dP}{dQ} - \frac{dC}{dQ} = 0$$

$$\implies P(Q) + Q\frac{dP}{dQ} = \frac{dC}{dQ}$$

$$\implies MR = MC$$

(P^*, Q^*) is profit-maximizing choice.

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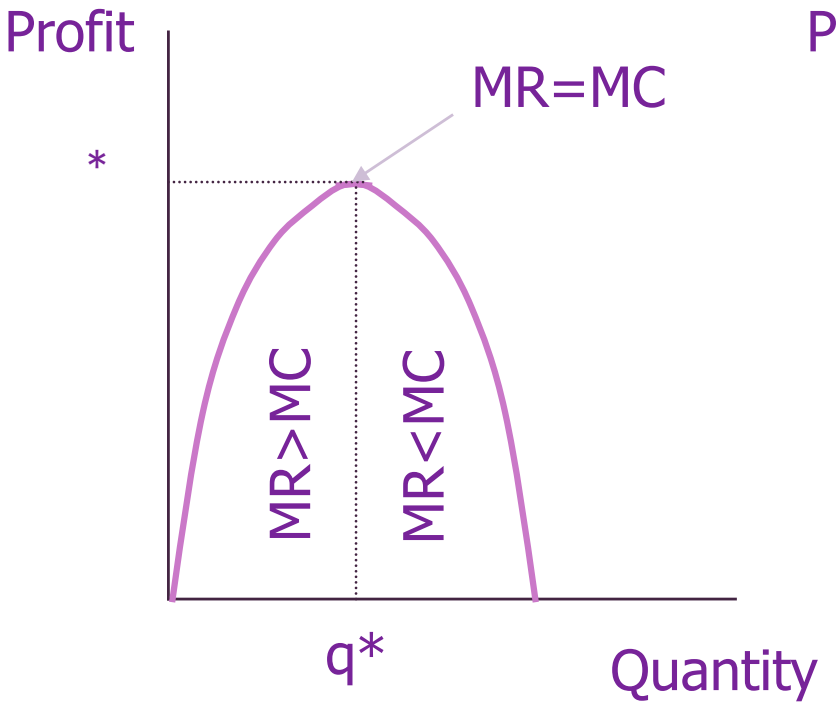
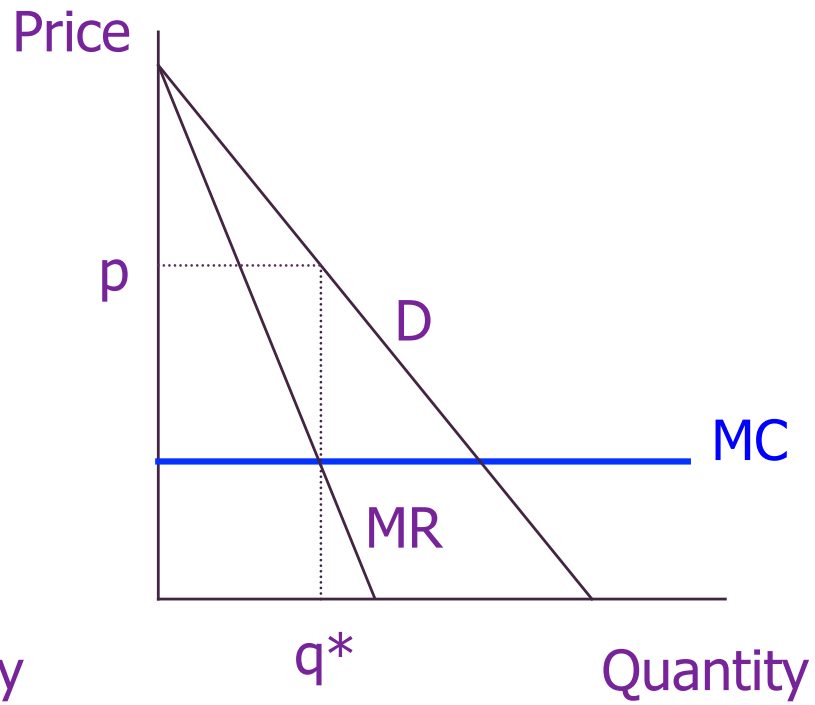
Base Case: Profit Maximization





Increase q if MR>MC
Decrease if MR<MC

At optimum, MR=MC

Monopoly

Base Case

Note that Marginal Revenue may be written:

$$MR = \frac{dR}{dQ} = \frac{d[P(Q)Q]}{dQ} = P + \frac{dP}{dQ}Q$$

$$P + \frac{dP}{dQ}\frac{PQ}{P} = P\left(1 + \frac{1}{\varepsilon_d}\right)$$

Monopoly

Base Case

Inverse Elasticity Rule for Monopolist:
Price Cost Margin, Markup, or Lerner Index is:

$$L = \frac{P - MC}{P}$$

The monopolist chooses output such that the markup equals the inverse of the elasticity of demand:

$$\begin{aligned} \frac{P(Q) - \frac{dC(Q)}{dQ}}{P(Q)} &= \frac{-Q\frac{dP(Q)}{dQ}}{P(Q)} \\ &= \frac{-Q}{P}\frac{dP(Q)}{dQ} \\ &= \frac{1}{-\varepsilon_d} > 0 \end{aligned}$$

Monopoly

Base Case: Welfare and Efficiency

- What is the welfare impact of monopoly?
  - Graphically
  - Algebra
- What is the reason that there is DWL?

Monopoly

Base Case: Summary

To Reiterate: The Pricing Rule of A Monopolist Is:

- $$MR = P\left(1 + \frac{1}{-|\varepsilon_d|}\right) = MC$$
- or equivalently:
$$\frac{P - MC}{P} = \frac{1}{-\varepsilon_d}$$

Flatter demand implies higher ε_d holding P and Q fixed, a lower monopoly markup and lower DWL.

Monopoly

Base Case: Summary

Monopolists induce inefficient rent-seeking behavior and monopoly profit is a transfer from consumers.

But: there are benefits to monopoly: Incentives to innovate (new products, more efficient production).

Monopoly

Examples and Exercises: See handout