

Monopoly Chapter 24



Motivating Questions

- What price and quantity does a monopoly choose?
- What are the welfare effects of monopoly?
- What are the effects of taxes on monopolies?
- Is monopoly every justified/efficient?

What is a monopoly?

- A monopoly is a sole supplier of a good.
- The monopolist's demand curve is the market demand curve.
- *Price maker* not a price taker
- Can set price (quantity is constrained by demand curve relationship)
- Or: chooses quantity, which determines price

What causes monopolies?

- Legal fiat: US Postal Service
- Patent: drugs, technology; intellectual property
- Sole ownership of a resource: toll road
- Cartel: OPEC
- Large economies of scale: local utilities

Government & Monopoly

Monopoly is heavily regulated

- Antitrust Law: abuse of monopoly power is a felony
- Dept. of Justice (DOJ) has antitrust division
- Federal Trade Commission (FTC) has regulatory oversight

But govt. creates monopolies (USPS) and issues patents/copyrights that grant monopoly power.

If if monopoly is so bad, why does the government enable it in some cases?

What quantity maximizes profits?

Setup the problem:

- For any firm, profit is given by

$$\Pi(y) = R(y) - C(y),$$

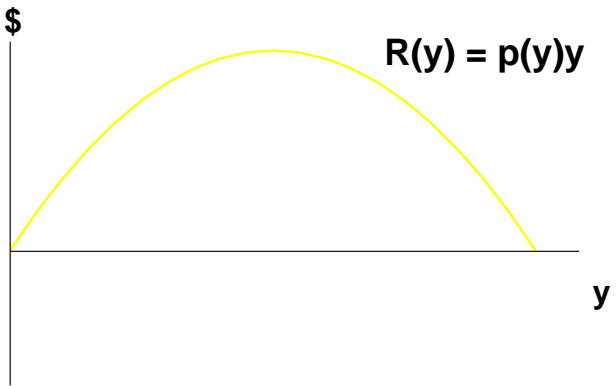
where $R(y)$ is revenue and $C(y)$ is cost.

- Profit maximization problem:

$$\max_y R(y) - C(y)$$

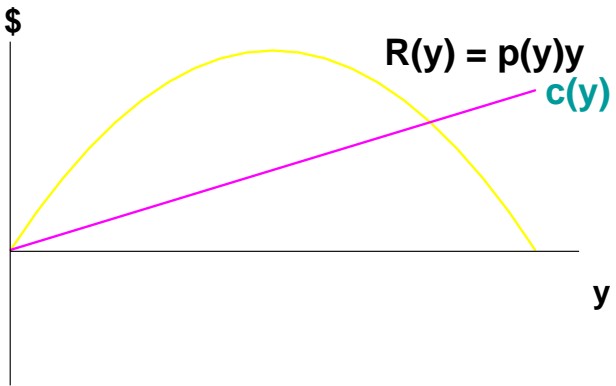
What quantity maximizes profits?

Graphical analysis:



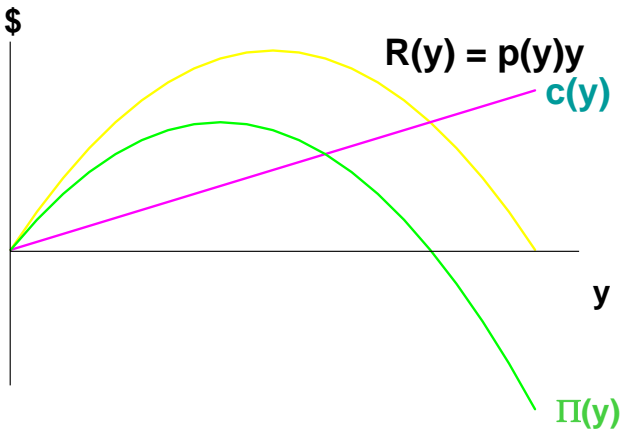
What quantity maximizes profits?

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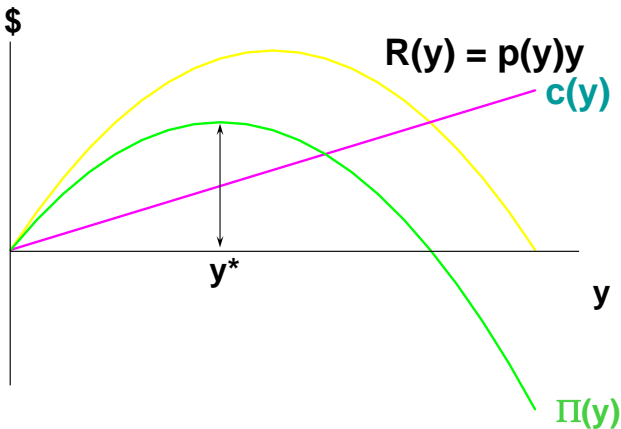
What quantity maximizes profits?

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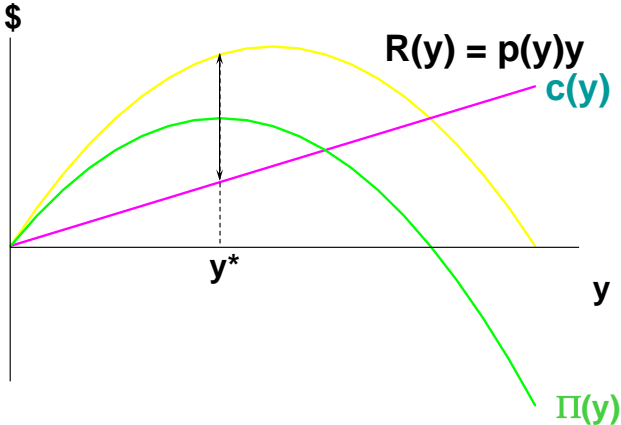
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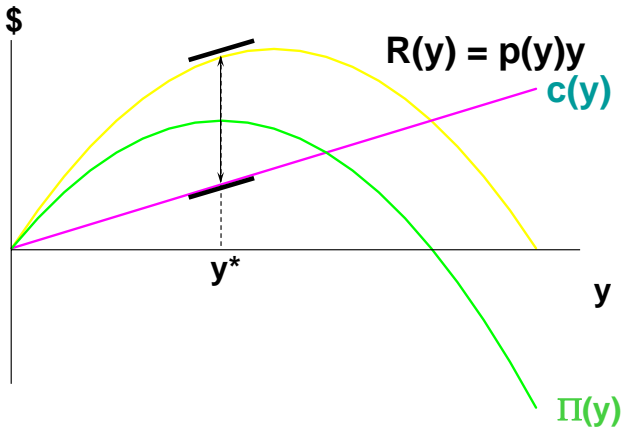
What quantity maximizes profits?

Graphical analysis:



What quantity maximizes profits?

Graphical analysis:



At the profit-maximizing output level, the slopes of the revenue and cost curves are equal: $MR(y^*) = MC(y^*)$.

What quantity maximizes profits?

Algebraic analysis:

- Optimality condition:

$$\frac{d\Pi(y)}{dy} = 0 \implies R'(y) - C'(y) = 0 \implies R'(y) = C'(y)$$

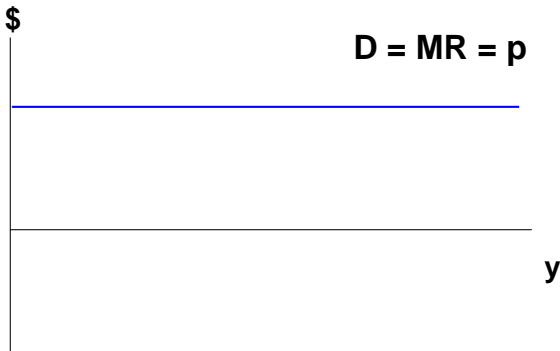
- At the profit maximizing quantity, y^* :

$$MR(y) = MC(y)$$

What quantity maximizes profits?

Algebraic analysis:

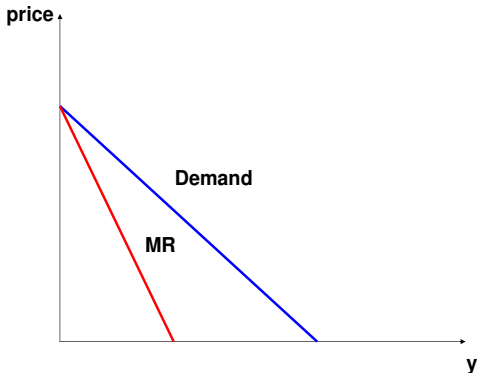
- **If the market is competitive**, the firm takes p as given/fixed (demand curve is flat)
- In that case, $R(y) = py$, where p is constant, so $MR(y) = p$.
- Profit-maximizing condition: $p = MC$



What quantity maximizes profits?

Algebraic analysis:

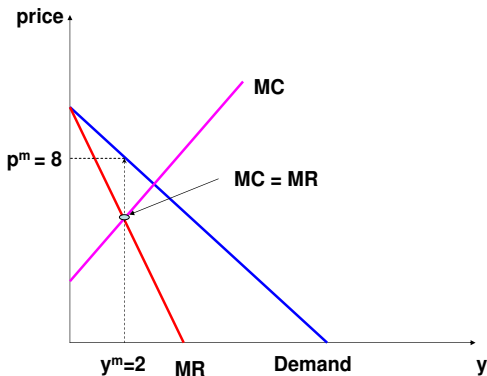
- Monopoly is not a price taker, though
- Demand slopes down
- Recall $MR(y) = P(y) + P^*(y)y$ is below $P(y)$



What quantity maximizes profits?

Algebraic analysis:

- Choose quantity y^* s.t. $MR = MC$
- Set price according to $P(y^*)$
- Profit-maximizing condition: $p = MC$
- Price is marked-up over marginal cost $p > MC$



Monopoly: Example

- Inverse Demand: $P(y) = 10 - y$, so marginal revenue is...
- **Clicker Vote:**
 - A) $MR = -1$
 - B) $MR = 10 - \frac{y}{2}$
 - C) $MR = 10 - y$
 - D) $MR = 10 - 2y$

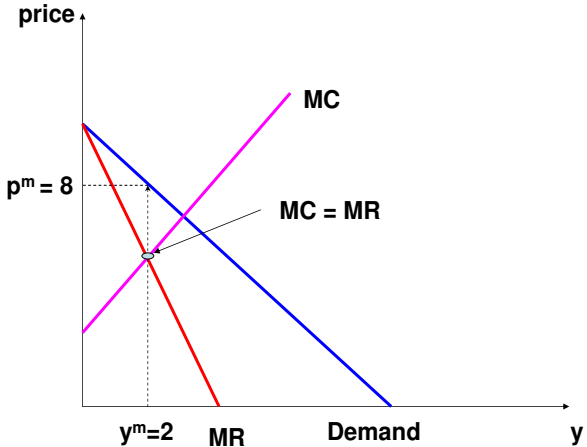
Monopoly: Example

- Inverse Demand: $P(y) = 10 - y$, so marginal revenue is $MR(y) = 10 - 2y$.
- Cost function: $C(y) = 2y + y^2$, so $MC(y) = 2 + 2y$
- Optimality condition:

$$MR = MC \implies 10 - 2y = 2 + 2y$$

- So $y^m = \frac{8}{4} = 2$
- ... and $p^m = P(y^m) = 10 - 2 = 8$

Monopoly: Example



Monopoly Price and Elasticity of Demand

How does the monopoly price relate to the elasticity of demand?

$$MR = p(y) + y \frac{dp(y)}{dy} = p(y) \left[1 + \frac{y}{p(y)} \frac{dp(y)}{dy} \right]$$

Recall that

$$\epsilon = \frac{p(y)}{y} \frac{dy}{dp(y)}.$$

So

$$MR = p(y) \left[1 + \frac{1}{\epsilon} \right].$$

Monopoly Price and Elasticity of Demand

How does the monopoly price relate to the elasticity of demand?

- $MR = p(y)[1 + \frac{1}{\epsilon}]$ and $MR = MC$, so $MC = p(y)[1 + \frac{1}{\epsilon}]$.
- Rewrite as

$$p(y) = \frac{MC}{1 + \frac{1}{\epsilon}}$$

- Note that $MR, p > 0$ implies $\epsilon < -1$
- This means that a monopolist chooses an output level at which demand is elastic.
- Intuition: if on inelastic part, cutting output (raising price) increases revenue (and maybe lowers costs)

Monopoly Price and Elasticity of Demand

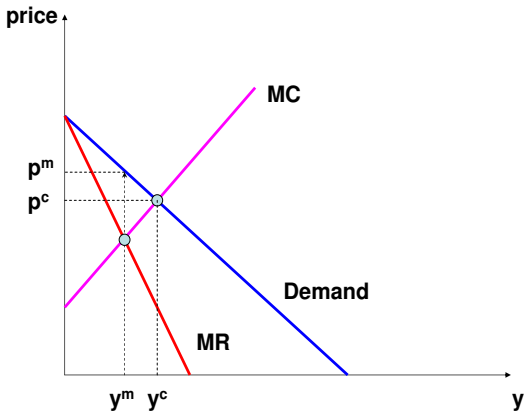
How does the monopoly price relate to the elasticity of demand?

$$p(y) = \frac{MC}{1 + \frac{1}{\epsilon}}$$

- Because elasticity is negative (demand slopes down), price is always above MC
- Markup pricing: price is marginal cost plus a “markup”. What happens to the markup as demand becomes less elastic?
- Monopolist increases price
- Example: if $\epsilon = -3$, $p(y) = \frac{3MC}{2}$; if $\epsilon = -2$, $p(y) = 2MC$

Perfect Competition vs. Monopoly

Price and Quantity: given a cost function, how does the behavior of a monopolist compare to that of a competitive firm?

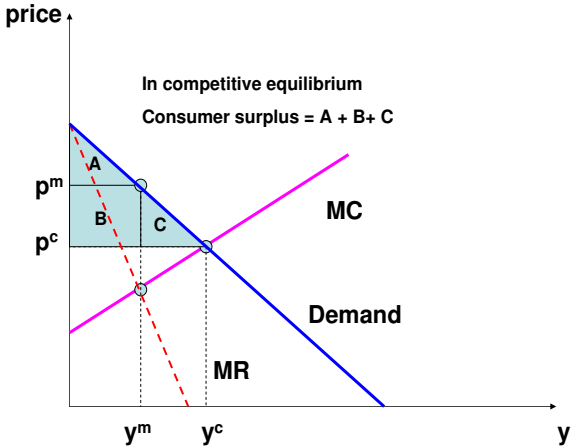


$$p^m > p^c \text{ and } y^m < y^c$$

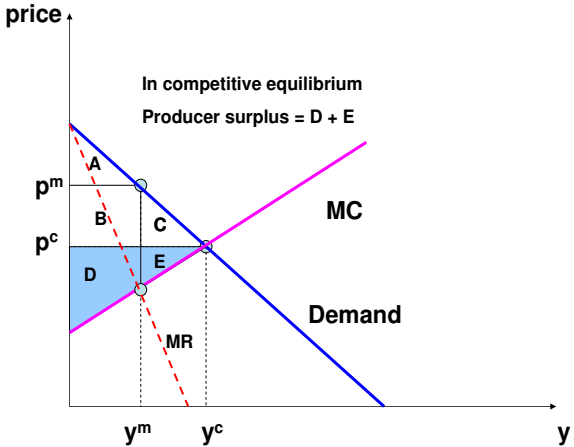
Inefficiency of Monopoly

- What are the welfare effects of monopoly? Who gains and who loses?
- Since $p^m > p^c$, seller gains, consumers lose
- But since $y^m < y^c$, we know that there are unrealized gains from trade. So the losses outweigh the gains: there is some welfare loss.
- The deadweight loss (DWL) is the societal loss in welfare. It measure the inefficiency of monopoly relative to the competitive outcome.

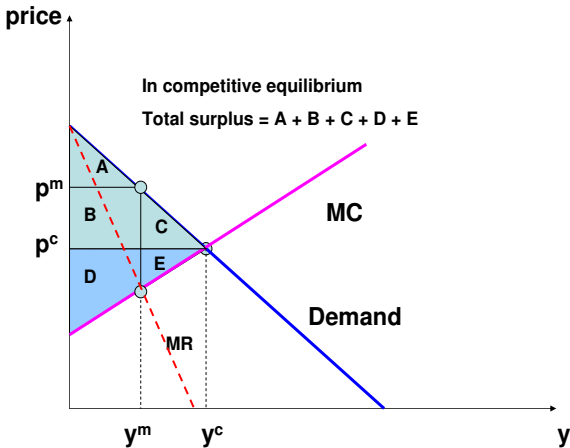
Calculating the DWL of Monopoly



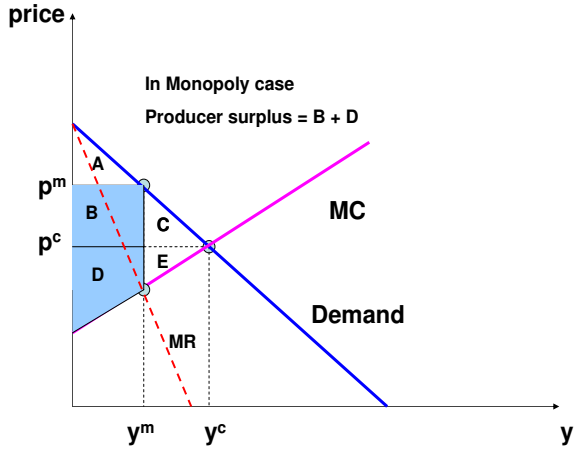
Calculating the DWL of Monopoly



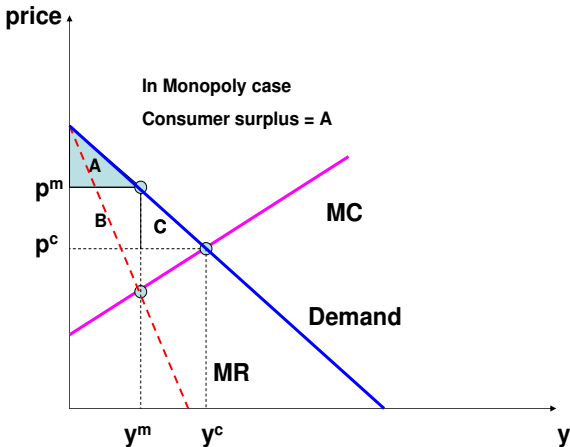
Calculating the DWL of Monopoly



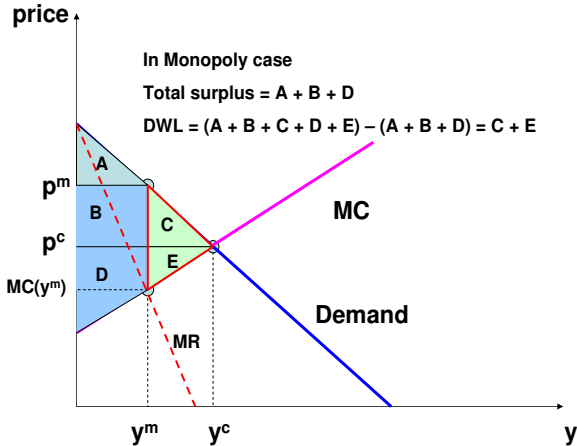
Calculating the DWL of Monopoly



Calculating the DWL of Monopoly



Calculating the DWL of Monopoly



Inefficiency of Monopoly

The need for regulation

- Competitive market provides greater surplus than monopoly
- Can changing from a monopolistic market to a competitive one make *everyone* (consumers and monopolist) better off (Pareto improving)?
- In other words, is there room for a Pareto improving deal in which a monopolist agrees to act like a competitive firm?
- No, because this will make the firm worse off
- Thus, the DWL of monopoly rationalizes antitrust laws

Example (continued)

- Inverse demand: $P(y) = 10 - y$
- Marginal cost: $MC(y) = 2 + 2y$
- Recall: $p^m = 8$ and $y^m = 2$
- What is the competitive equilibrium?
- Use $p = MC$

$$P(y^c) = 10 - y^c = 2 + 2y^c = MC(y^c)$$

- So $y^c = \frac{8}{3}$ and $p^c = \frac{22}{3}$

Example (continued)

- So what is the DWL of monopoly?
- We can calculate DWL using

$$DWL = \frac{1}{2}[P(y^m) - MC(y^m)][y^c - y^m]$$

- Aside: in general, this is an approximation. Because of linear demand, MC, here it is exact.
- So DWL is

$$DWL = \frac{1}{2}[8 - 6]\left[\frac{8}{3} - 2\right] = \frac{2}{3}$$