Microeconomics II

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About the course

- **Book**: Hal R. Varian, Intermediate Microeconomics: A Modern Approach, 9th Edition

- **Lectures**: Discuss theory via slides

- **Tutorials**: Discuss exercises. Try to make the exercises ex-ante without looking at the answers.

- **Fenix**: Everything you need can be found in the folder "All you need" (EN)

- **Assessment**:
  - (i) final grade = midterm-test (40%) + final exam (60%)
    - But, final grade = final exam if final exam grade > midterm-test grade
  - (ii) final grade = final exam (100%)

Program

Part I

- Ch. 25 – Monopoly
- Ch. 26 – Monopoly Behaviour
- Ch. 28 – Oligopoly
- Ch. 29 – Game Theory

Part II

- Ch. 12 – Uncertainty
- Ch. 38 – Assymetric Information
- Ch. 35 – Externalities
- Ch. 37 – Public Goods
- Ch. 36 – Information Technology*

INTERMEDIATE MICROECONOMICS

NINTH EDITION

HAL R. VARIAN

CHAPTER 25

Monopoly

What is a Monopoly?

A market that is a monopoly has a **single seller**.

The monopolist's demand curve is the entire (downward sloping) market demand curve.

So, the monopolist can alter the market price by adjusting its output level.

This in contrast to a firm in a perfect competitive market, where the demand curve is horizontal so that the price is given.

Demand Curve of a Monopolist

$p(y)$

Higher output y causes a lower market price, $p(y)$.

Output level, y
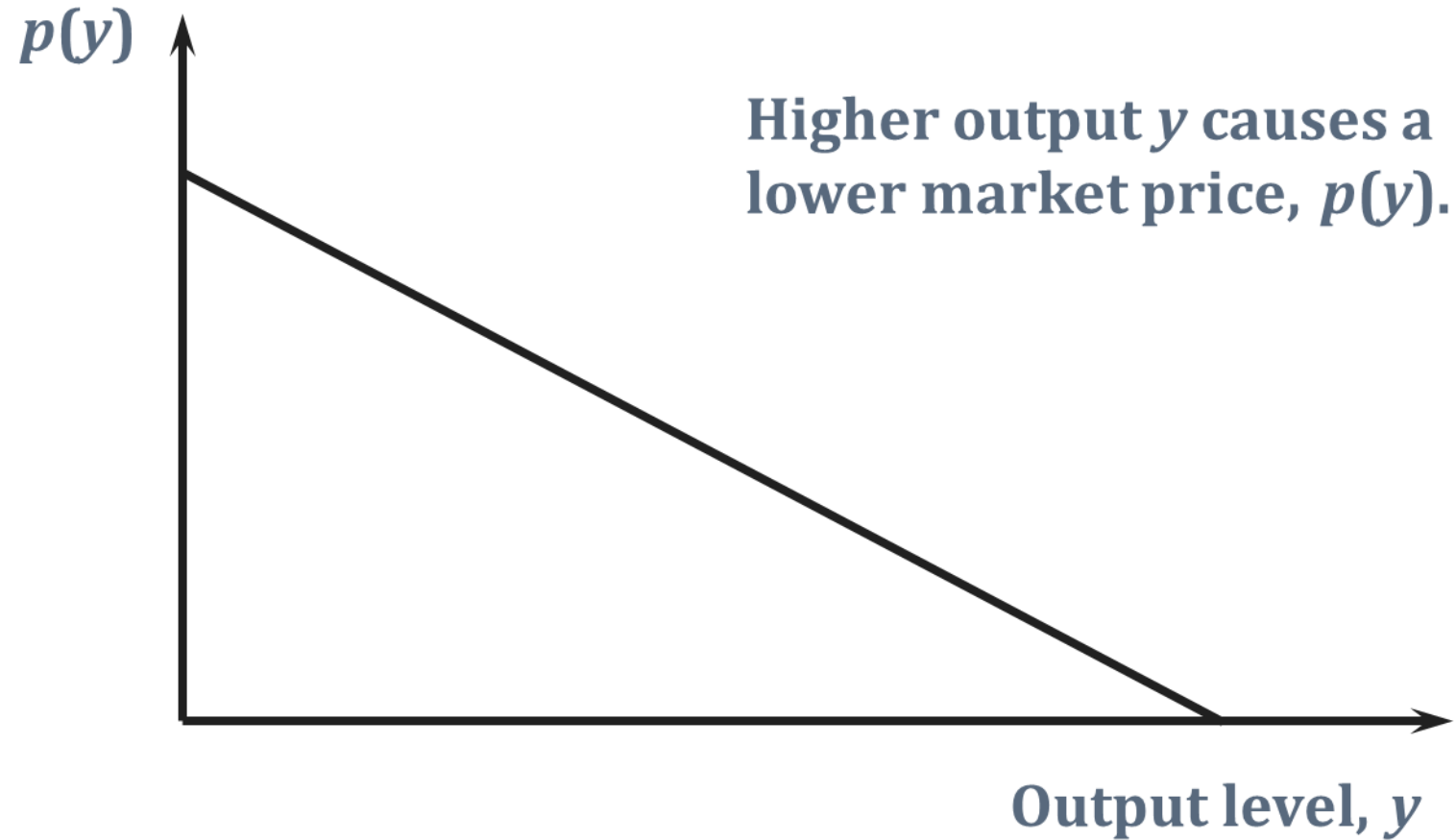
Why Monopolies?

What causes monopolies?
- a legal fiat (e.g., a postal service)
- a patent (e.g., a new drug)
- sole ownership of a resource (e.g., a toll highway)
- formation of a cartel (e.g., OPEC)
- large economies of scale (e.g., local utility companies)
  - Natural monopoly

Profit Maximization of Monopolist

Suppose that the monopolist seeks to maximize its economic profit,

$$\pi(y) = p(y) \cdot y - c(y).$$

What output level (y*) maximizes profit?

Profit Maximization

$$\pi(y) = p(y) \cdot y - c(y)$$
$$\pi(y) = r(y) - c(y)$$
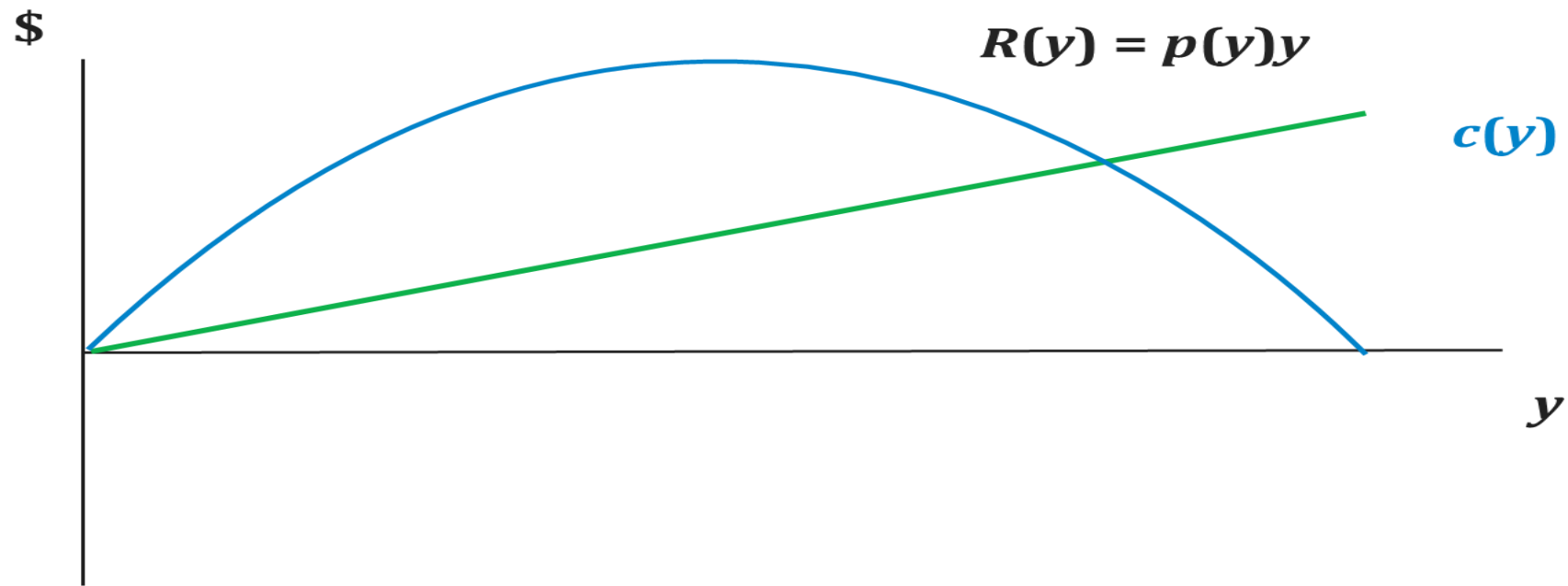
At the profit-maximizing output level $y = y^*$,

$$\frac{d\pi(y)}{dy} = \frac{d}{dy}(p(y)y) - \frac{dc(y)}{dy} = 0.$$

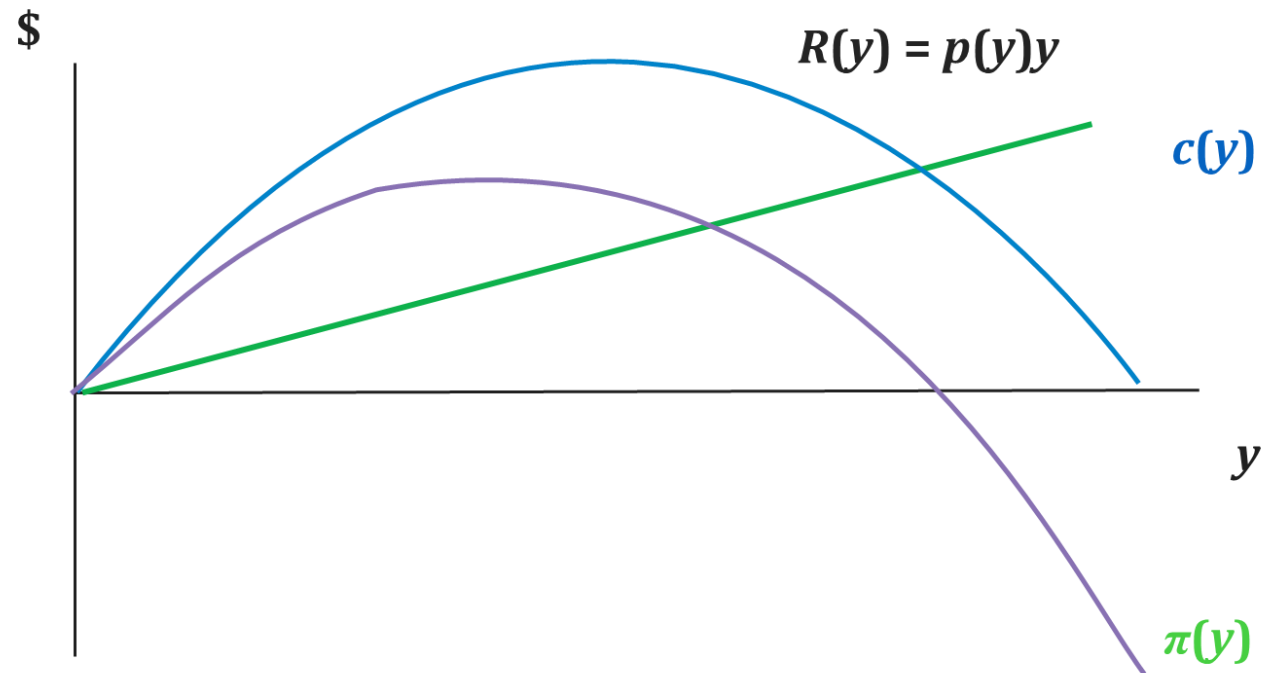$$\frac{d}{dy}(p(y)y) = \frac{dc(y)}{dy}.$$

$$mr(y) = mc(y).$$

Profit Maximization

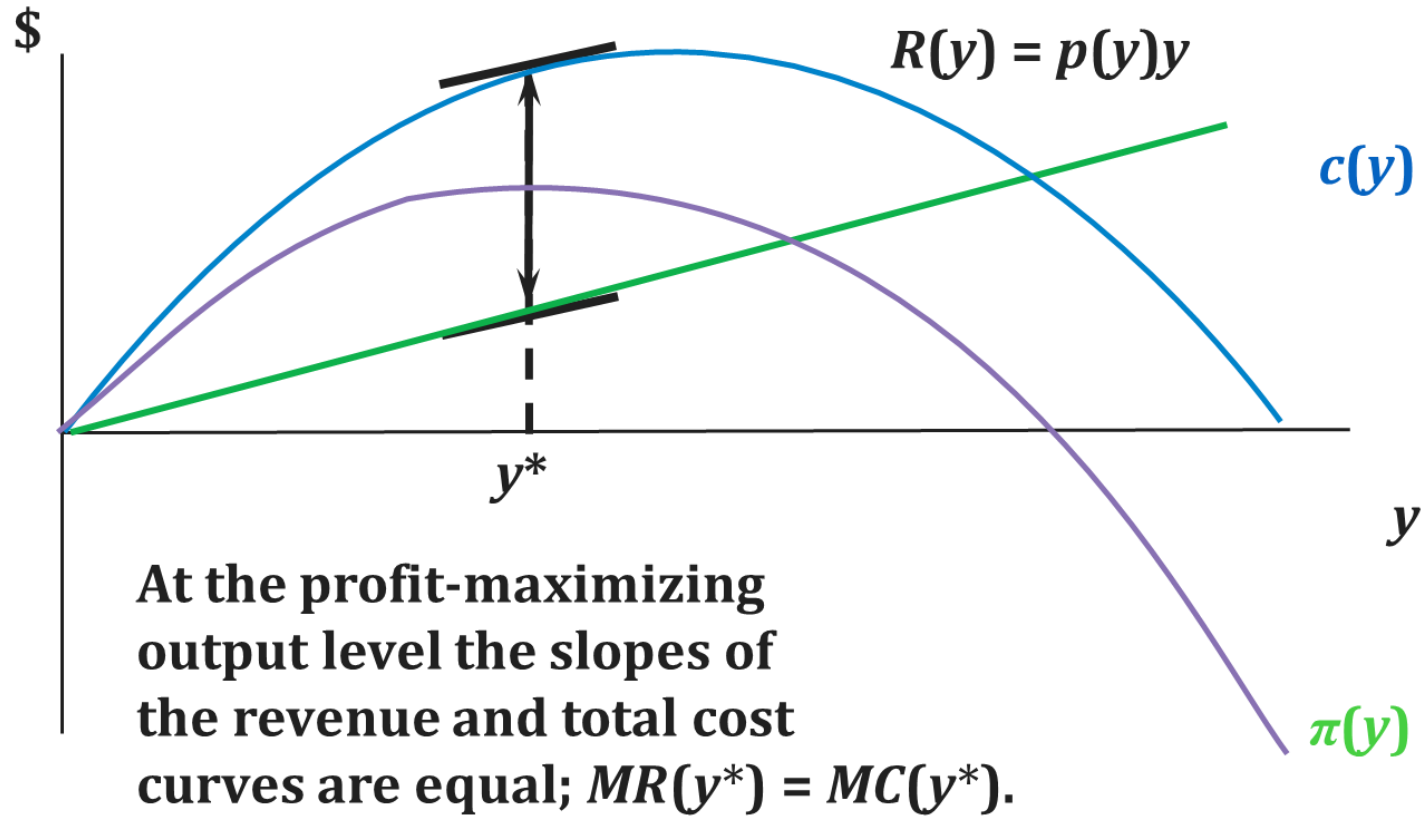# Profit Maximization

Profit Maximization

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

Marginal Revenue

Marginal revenue is the rate of change of revenue as output y increases:

$$MR(y) = \frac{d}{dy}(p(y)y) = p(y) + y\frac{dp(y)}{dy}.$$

$\frac{dp(y)}{dy}$ is the slope of the (inverse) demand function: $\frac{dp(y)}{dy} < 0.$

Therefore, $MR(y) = p(y) + y\frac{dp(y)}{dy} < p(y).$

For a monopolist the **marginal revenue is lower than the price** because if a monopolist sells one additional unit of output two things happen: (i) she gets the price, but (ii) she needs to lower the price (over all units) to sell that additional unit.

Marginal Revenue with Linear Demand

For example, if $p(y) = a - by$ then $R(y) = p(y)y = ay - by^2$.

And so, $MR(y) = a - 2by < a - by = p(y)$ for $y > 0$.
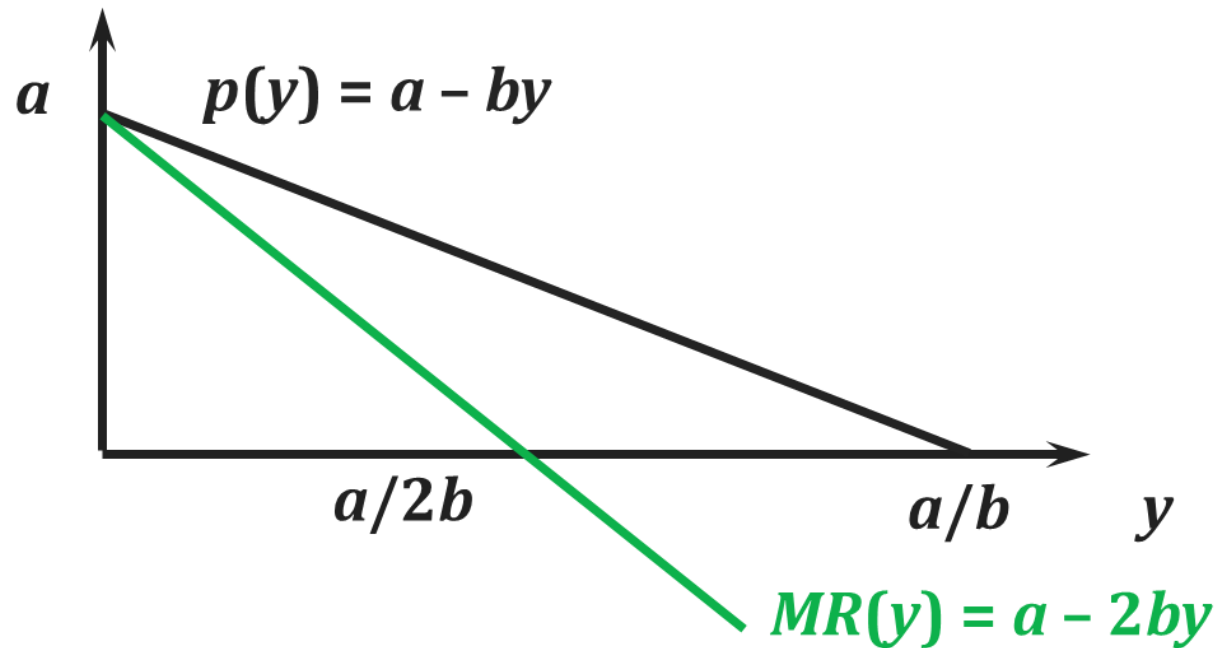
Marginal Cost

Marginal cost is the rate of change of total cost as the output level y increases:

$$MC(y) = \frac{dc(y)}{dy}.$$

For example, if $c(y) = F + \alpha y + \beta y^2$, then $MC(y) = \alpha + 2\beta y$.

Profit Maximization: An Example

At the profit-maximizing output level y^*, $MR(y^*) = MC(y^*)$.

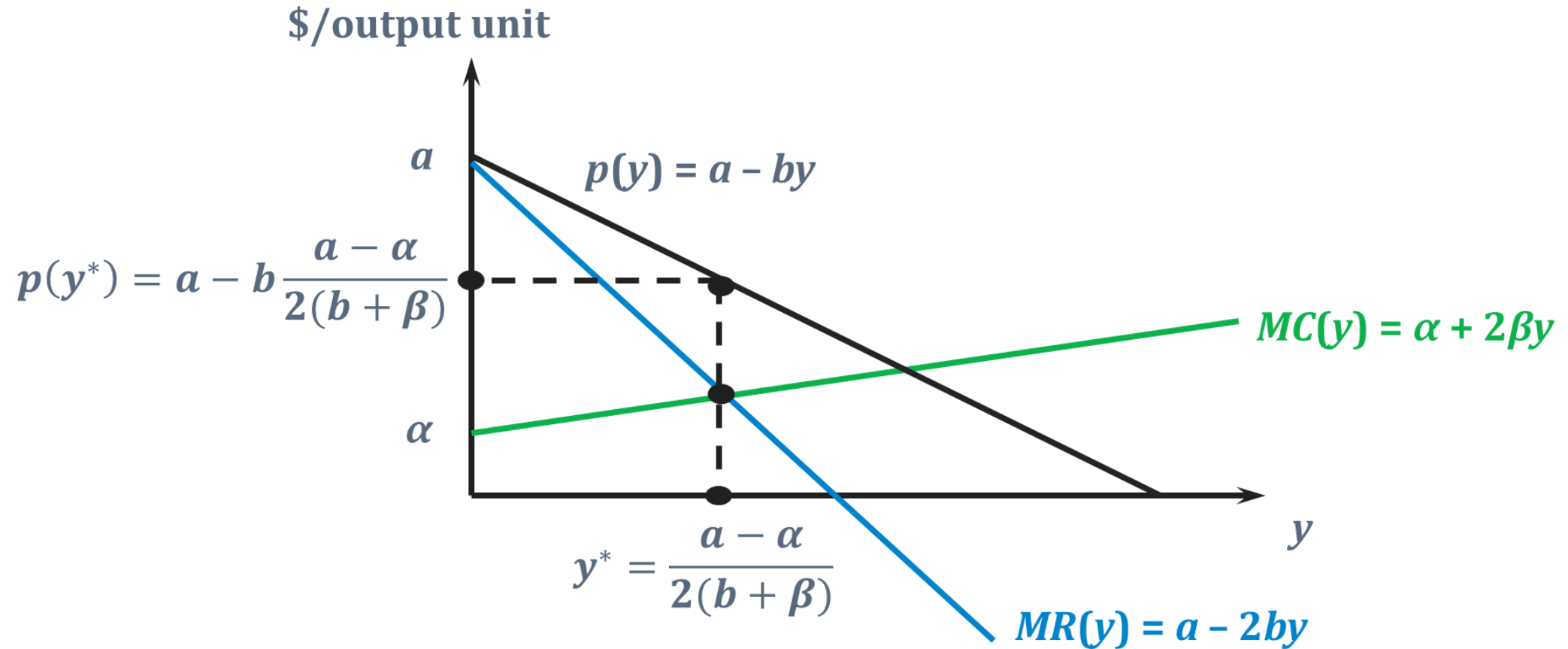So, if $p(y) = a - by$ and $c(y) = F + \alpha y + \beta y^2$

then $MR(y^*) = a - 2by^* = \alpha + 2\beta y^* = MC(y^*)$

And the profit maximizing level is $y^* = \dfrac{a - \alpha}{2(b + \beta)}$

Causing the market price to be $p(y^*) = a - by^* = a - b\dfrac{a - \alpha}{2(b + \beta)}$.

Profit Maximization: An Example

Monopolistic Pricing & Price Elasticity of Demand

Suppose that market demand becomes less sensitive to changes in price. That is, the (own) price elasticity of demand becomes less negative: if the price increases, demand decreases only a little.

Does the monopolist exploit this by increasing the price?

Monopolistic Pricing & Price Elasticity of Demand

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

Own-price elasticity of demand is $\varepsilon = \dfrac{p(y)}{y}\dfrac{dy}{dp(y)}$.

So, $MR(y) = p(y)\left[1 + \dfrac{1}{\varepsilon}\right]$.

Monopolistic Pricing & Price Elasticity of Demand

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

Suppose the monopolist's marginal cost of production is constant, at \$k per output. For a profit maximum,

$$MR(y^*) = MC(y^*)$$

$$p(y^*)\left[1 + \frac{1}{\varepsilon}\right] = k.$$

Which is $p(y^*) = \dfrac{k}{1 + \dfrac{1}{\varepsilon}}$.

Markup Pricing

Markup pricing: Output price is the marginal cost of production plus a "markup."

$$markup = p(y^*) - k$$

How big is a monopolist's markup and how does it change with the own-price elasticity of demand?

Markup Pricing

Since $p(y^*) = \dfrac{k}{1+\frac{1}{\varepsilon}} = \dfrac{k\varepsilon}{1+\varepsilon}$ is the monopolist's price, the **markup** is:

$$p(y^*) - k = \frac{k\varepsilon}{1+\varepsilon} - k = -\frac{k}{1+\varepsilon}.$$

For example, if ε = –3, then the markup is k/2. But if ε = –2, then the markup is k. **Hence, the lower the elasticity of demand the higher the mark up.** This should be intuitive.
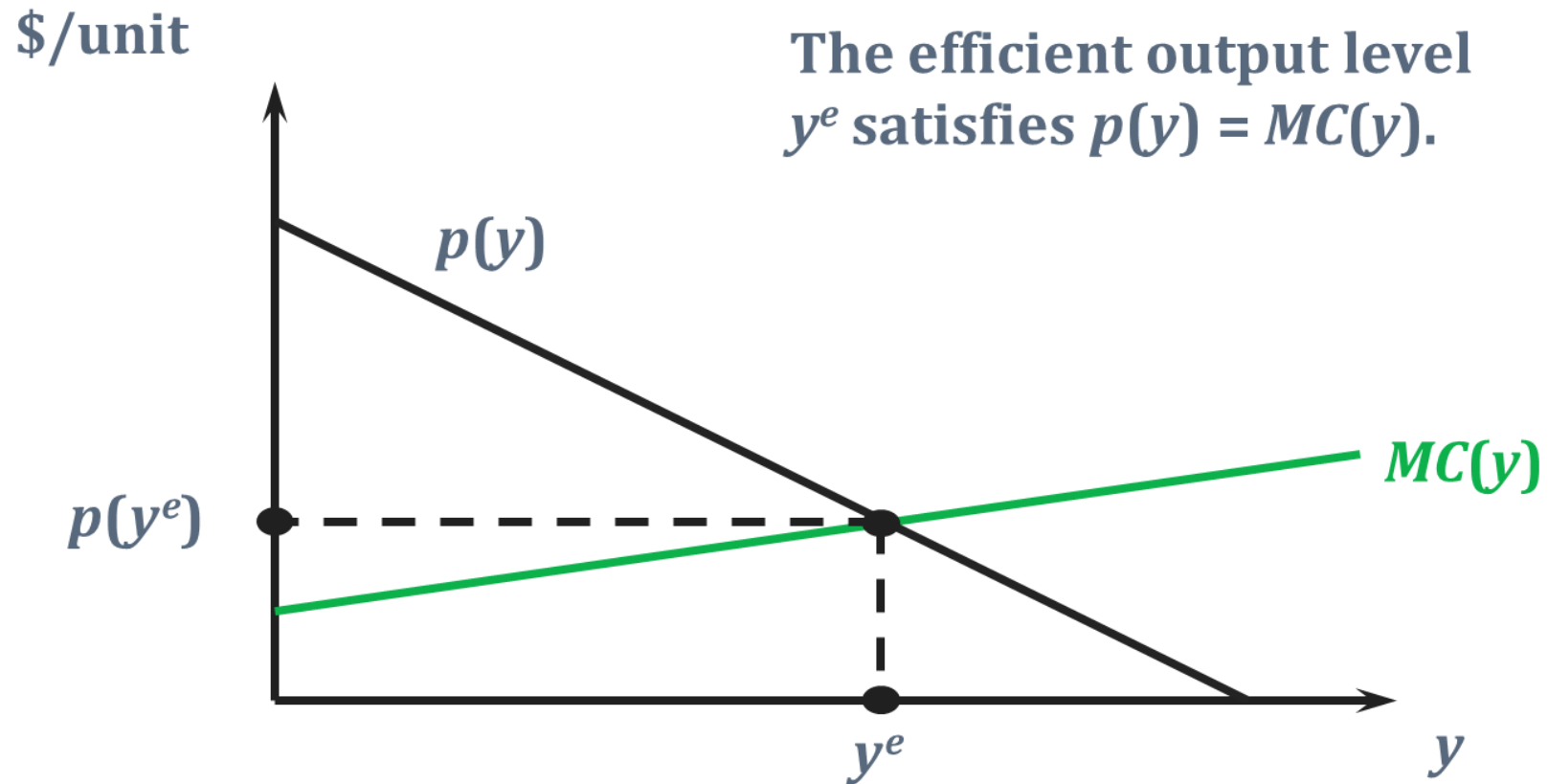
The Inefficiency of Monopoly

A market is **Pareto efficient** if it achieves the maximum possible total gains to trade.
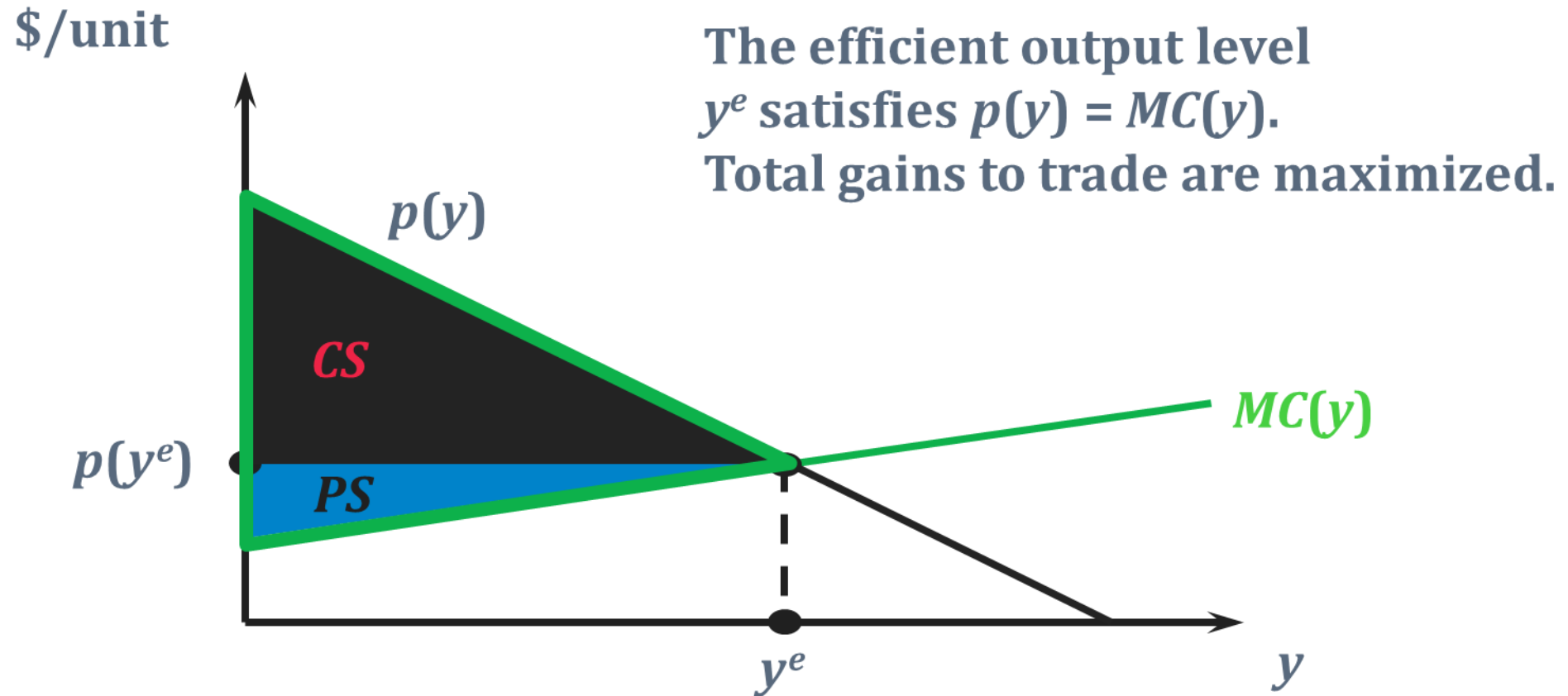
Otherwise, a market is **Pareto inefficient**.
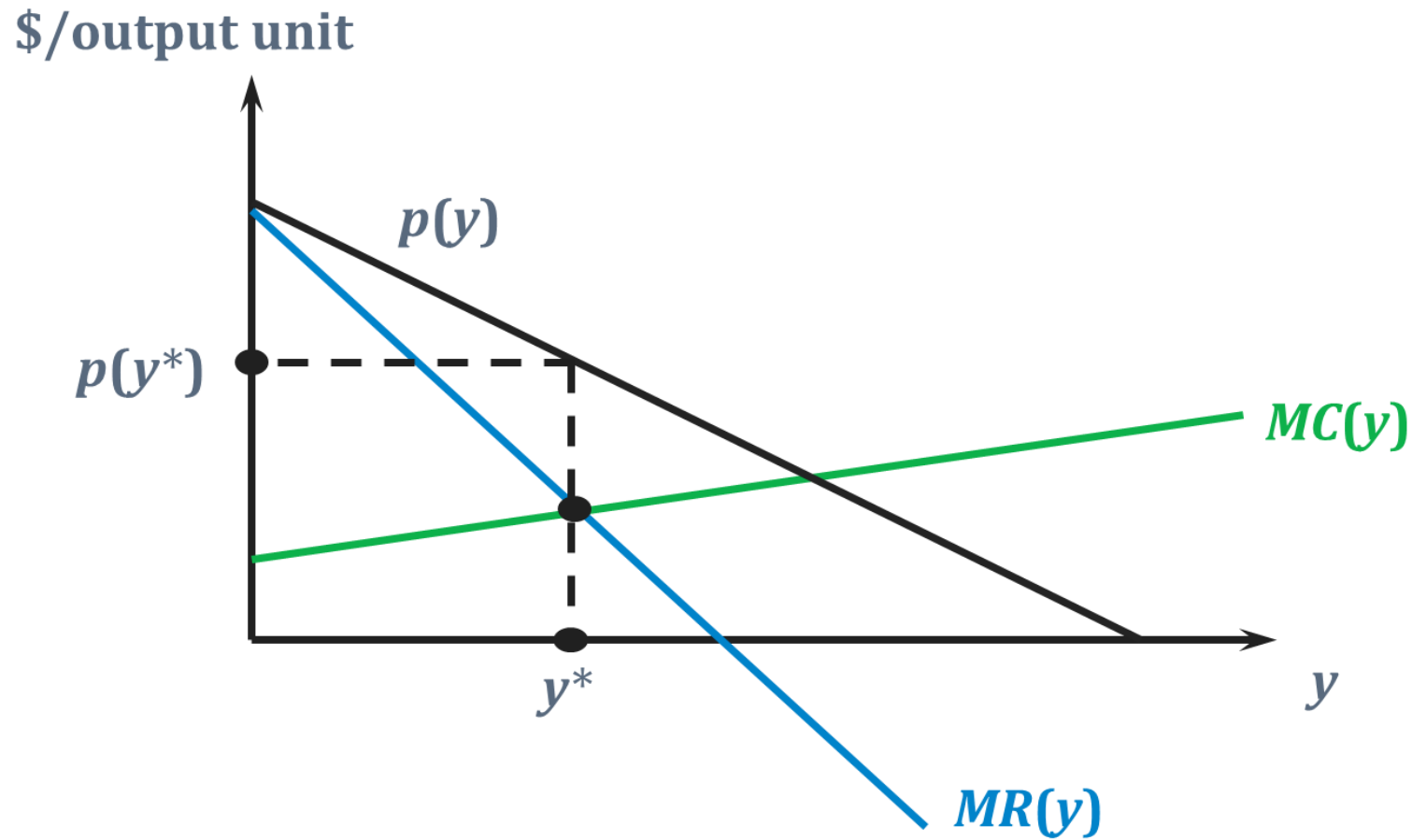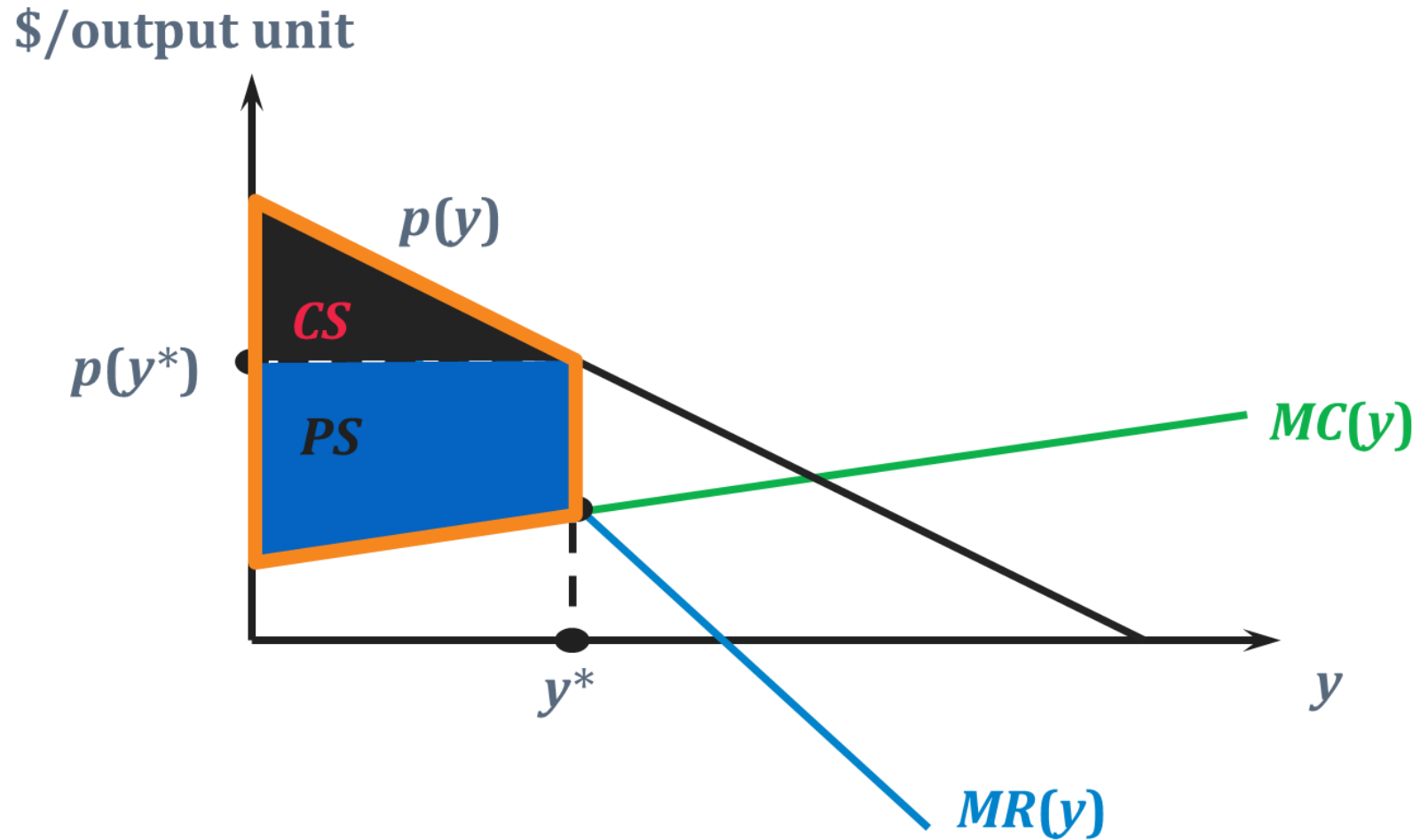
The Inefficiency of Monopoly

The Inefficiency of Monopoly

$/unit

The efficient output level
y^e satisfies $p(y) = MC(y)$.
Total gains to trade are maximized.
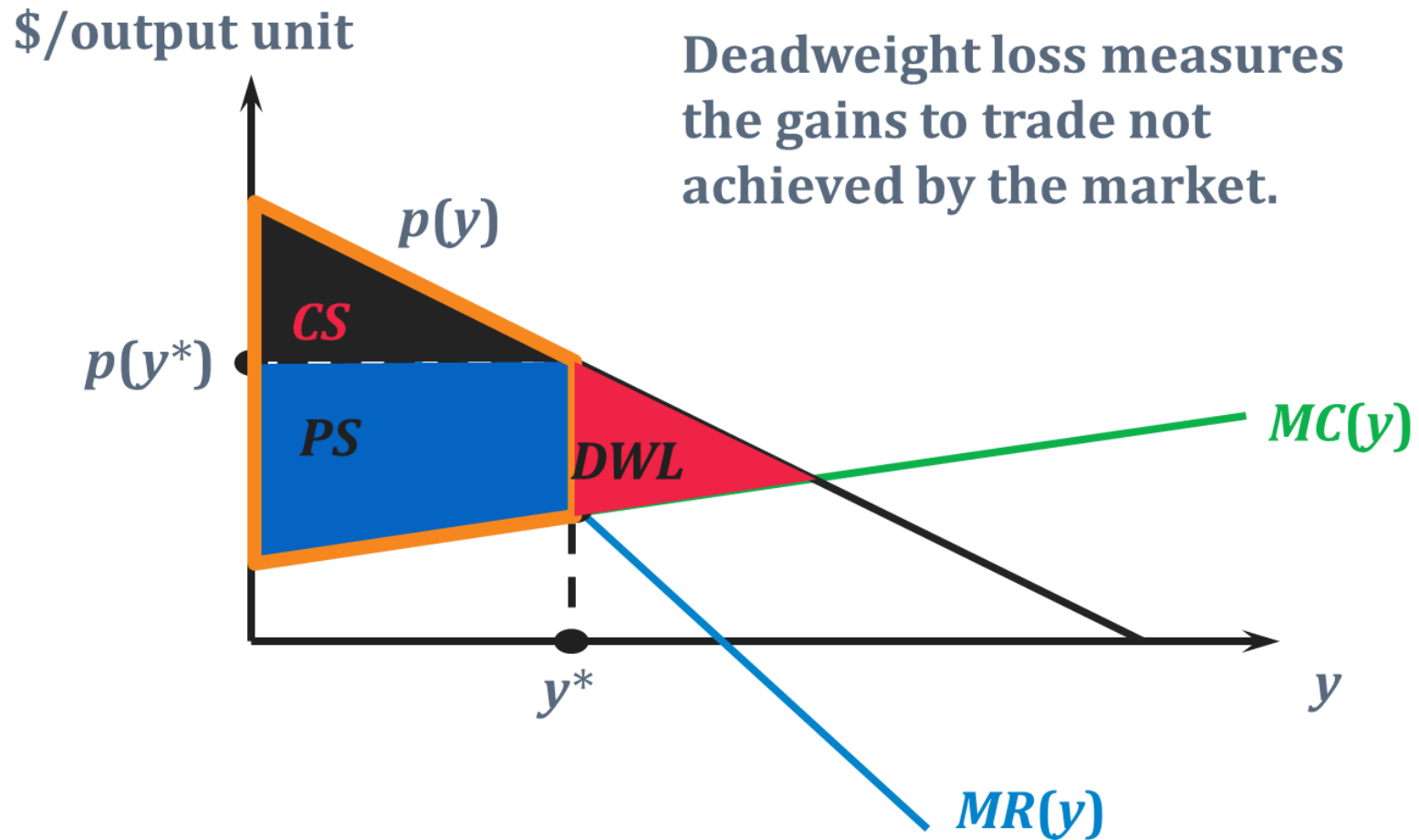
$p(y)$

CS

$MC(y)$

$p(y^e)$

PS

y^e

y

The Inefficiency of Monopoly

The Inefficiency of Monopoly

Deadweight Loss Quantifies the Inefficiency

Deadweight loss measures the gains to trade not achieved by the market.

Deadweight Loss Quantifies the Inefficiency
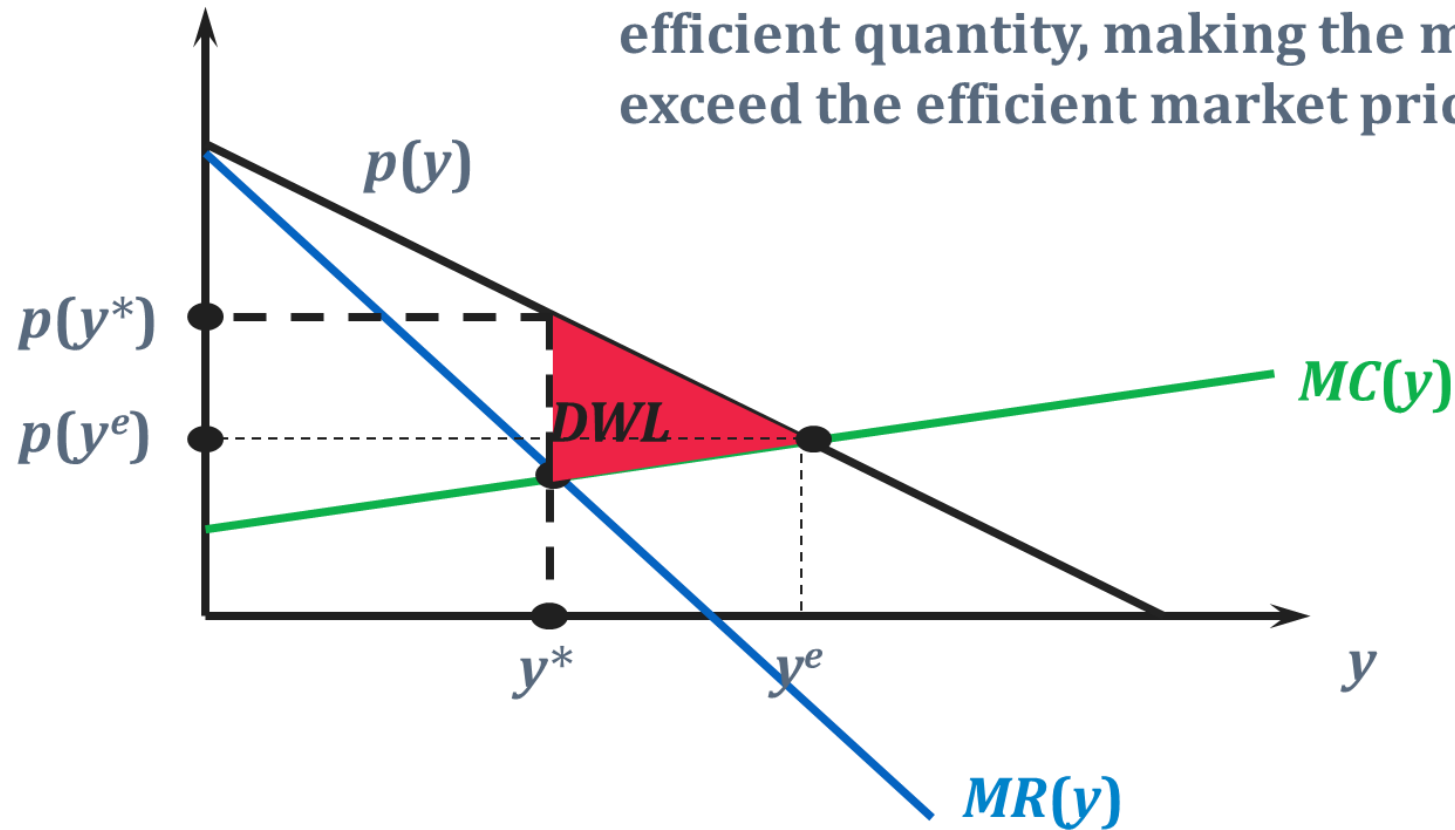
Natural Monopoly

A **natural monopoly** arises when the firm's technology is one with large fixed costs and low marginal costs.

In this case the **Minimum Efficient Scale** (MES = min(ATC)) takes place at high levels of production compared to market demand, such that one firm can supply the whole market at a lower average total production cost than is possible with more than one firm in the market.

In other words, if one firm is active in the market, she makes a positive profit. If many firms are active in the market, they may all make a loss.

Natural Monopoly
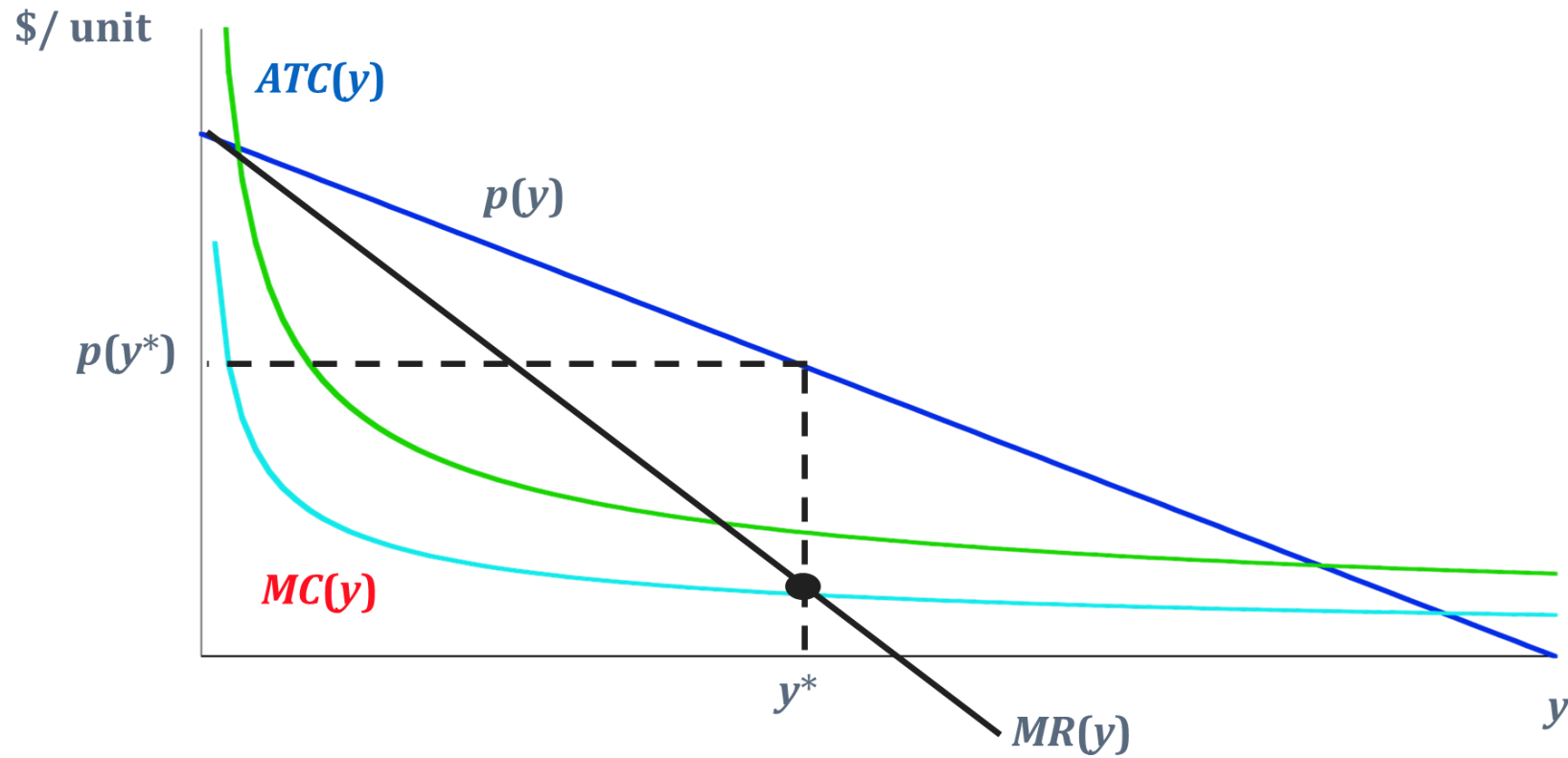
Entry Deterrence by a Natural Monopoly

A natural monopoly deters entry by threatening **predatory pricing** against an entrant.

A predatory price is a low price set by the incumbent firm when an entrant appears, causing the entrant's economic profits to be negative and inducing its exit.

Inefficiency of a Natural Monopolist

Like any profit-maximizing monopolist, the natural monopolist causes a deadweight loss.
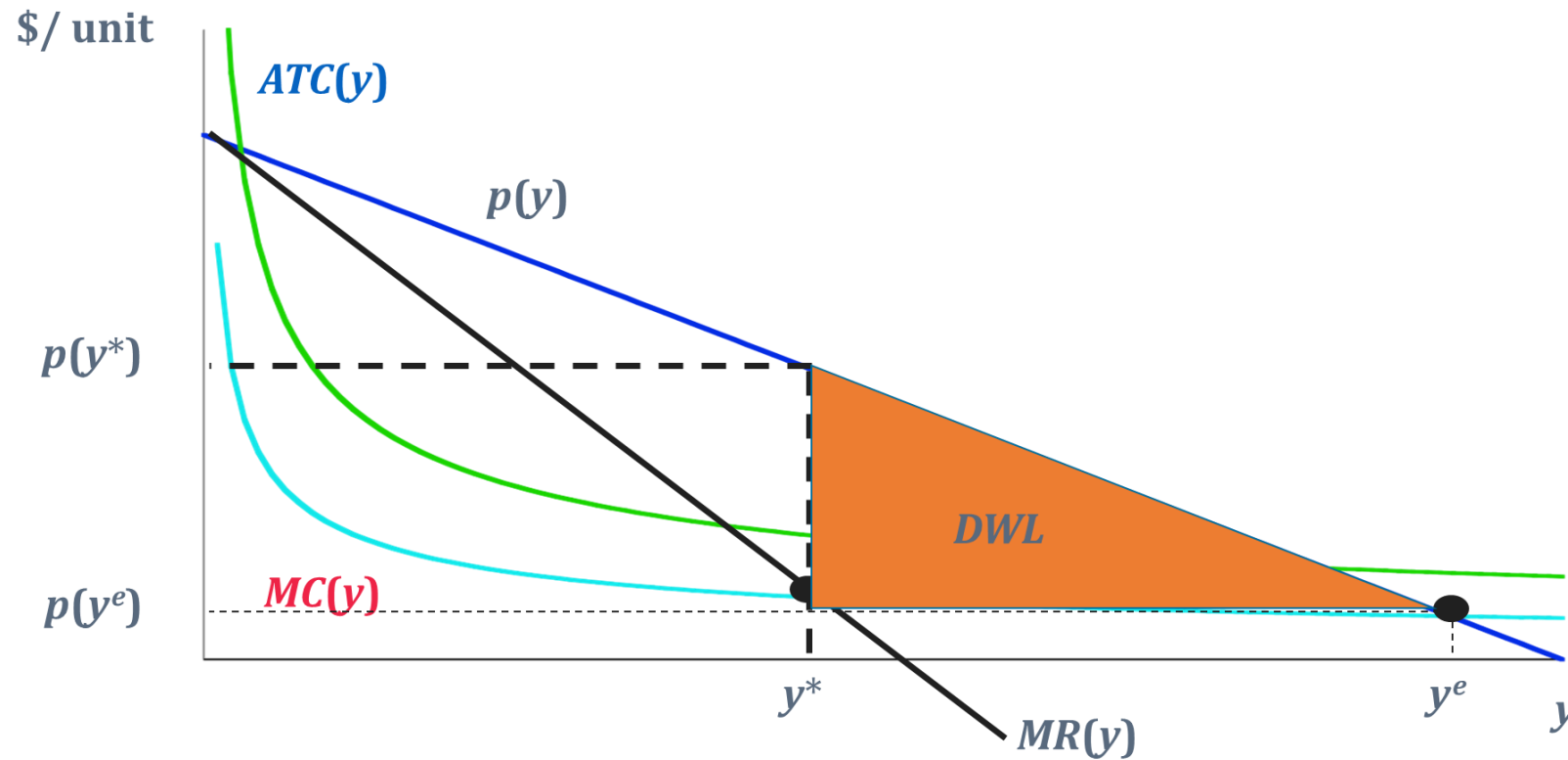
Regulating a Natural Monopoly

Why not command that a natural monopoly produce the efficient amount of output?

Then the deadweight loss will be zero, won't it?

Regulating a Natural Monopoly

A natural monopoly cannot be forced to use marginal cost pricing $(p(y^e), y^e)$. The firm will make a loss, exit, and the market and gains to trade will be gone.

Regulatory schemes may induce the natural monopolist to produce the efficient output level without exiting. For instance, command firm to produce at $(p(y^e), y^e)$ and subsidize the loss so that firm does not exit.