

# Monopoly (Ch25)

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April 28, 2025

# What We Have Learned

## Cost Minimization for Any Producer

- Find the optimal input bundle that minimizes total cost, given input prices  $w_1$ ,  $w_2$ , and a target output level  $y$ .  
⇒ Cost function:  $c(y) = w_1x_1^* + w_2x_2^*$ .

## Profit Maximization for a **Competitive Producer**

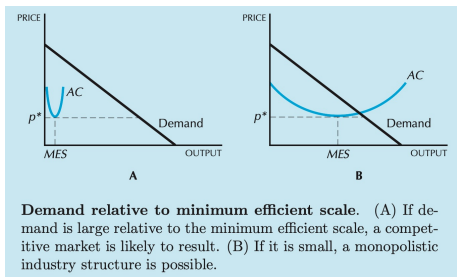
- Find the optimal output level that maximizes profit, given the output price  $p$ .  
⇒ Inverse supply function:  $p = MC(y)$ .

## Profit Maximization for a **Monopolist** ?

- Find the optimal output level that maximizes profit, given the inverse market demand  $p(y)$ .

# What Determines the Market Size in the Long Run?

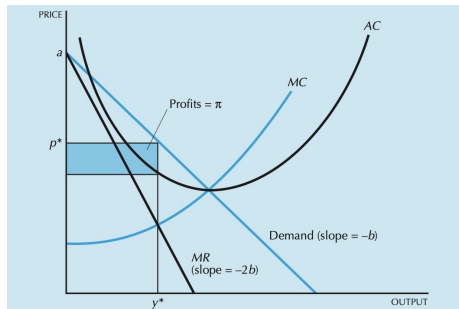
## Demand relative to Minimum Efficient Scale (MES)



- ▶ The minimum value of average cost:  
 $p^* = \min AC$
- ▶ **Minimum Efficient Scale (MES):** the individual supply at  $\min AC$
- ▶ Suppose firms have the same technology; then, the number of firms is  $n = \left\lfloor \frac{D(p^*)}{MES} \right\rfloor$  (rounding down).
- ▶ Monopoly if  $n = 1$ .

# Profit Maximization for a Monopolist

Monopolist is a Price Maker.

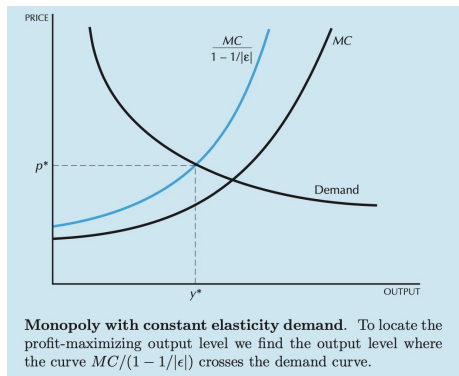


**Monopoly with a linear demand curve.** The monopolist's profit-maximizing output occurs where marginal revenue equals marginal cost.

- ▶ Given the market demand:  $D(p)$
- ▶ Write  $p$  as a function of quantity demanded:  $p(y)$
- ▶ The monopolist:  
$$\max_y \pi(y) = r(y) - c(y) = p(y)y - c(y)$$
- ▶ The **optimality condition**:  
$$MR(y^*) = MC(y^*)$$
- ▶ The monopoly price:  
$$p^* = p(y^*) > MC(y^*)$$

# Profit Maximization for a Monopolist

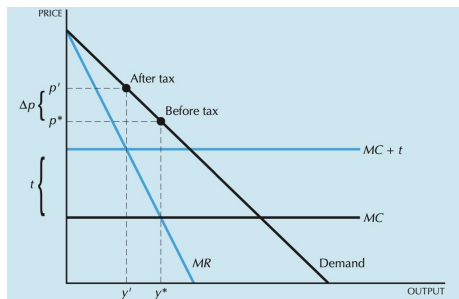
## Markup Pricing over MC



- ▶ Monopoly price:  $p^* = p(y^*) > MC(y^*)$
- ▶  $\frac{\Delta r(y)}{\Delta y} = \frac{p\Delta y + y\Delta p}{\Delta y} = p + p\frac{\Delta p/p}{\Delta y/y}$
- ▶  $MR(y^*) = \frac{\Delta r}{\Delta y}|_{y^*} = p^*[1 - \frac{1}{|\epsilon(y)|}] = MC(y^*)$
- $\Rightarrow p^* = \frac{1}{1 - 1/|\epsilon(y^*)|} MC(y^*)$
- ▶ The **markup**:  $\frac{1}{1 - 1/|\epsilon(y)|} > 1$
- $\Rightarrow |\epsilon(y)| > 1$ : A monopolist never operates where the demand curve is inelastic.
- ▶ Consider a constant-elasticity demand curve, the markup is constant.

# The Impact of Taxes on a Monopolist

Example: Constant  $MC = c$

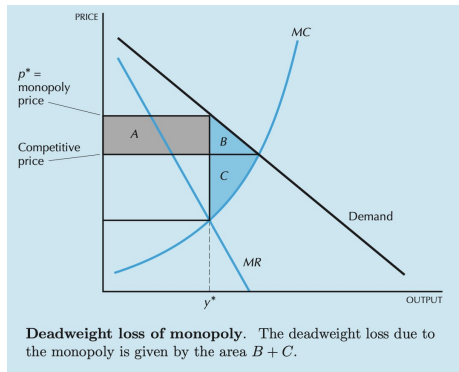


**Linear demand and taxation.** Imposition of a tax on a monopolist facing a linear demand. Note that the price will rise by half the amount of the tax.

- ▶ Markup pricing:  $p^* = \frac{1}{1 - 1/|\epsilon(y^*)|} (c + t)$
- ▶ Suppose a constant-elasticity demand.  
 $\Rightarrow$  Since  $|\epsilon| > 1$ ,  $\frac{\Delta p^*}{\Delta t} > 1$ , the monopolist passes on more than the amount of the tax.
- ▶ Suppose Linear market demand:  
 $p(y) = a - by$   
 $\Rightarrow y^* = \frac{a - c - t}{2b}$ ,  $p^* = a - by^*$   
 $\Rightarrow \frac{\Delta p^*}{\Delta t} = -b \frac{\Delta y^*}{\Delta t} = -b * \frac{-1}{2b} = \frac{1}{2}$ , the monopolist passes on half of the tax.

# Deadweight Loss of Monopoly

## Inefficiency of monopoly



- ▶ A monopolist produces less than the competitive amount of output and is therefore Pareto inefficient.
- ▶ From competitive equilibrium to monopoly:

$$\Rightarrow \Delta CS = -(A + B)$$

$$\Rightarrow \Delta PS = A - C$$

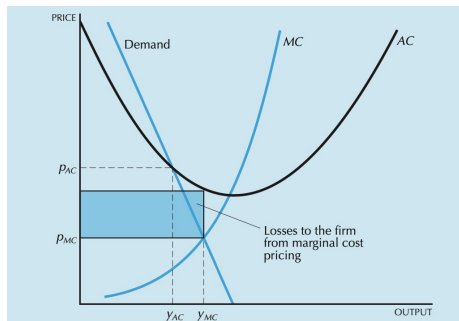
$$\Rightarrow \Delta TS = \Delta CS + \Delta PS = -B - C$$

$$\Rightarrow \text{Deadweight loss}$$

$$= \max TS - TS^{\text{Monopoly}} = -\Delta TS = B + C$$

# Regulating Natural Monopoly

## Minimum Efficient Scale (MES) is Large Relative to Demand



**A natural monopoly.** If a natural monopolist operates where price equals marginal cost, then it will produce an efficient level of output,  $y_{MC}$ , but it will be unable to cover its costs. If it is required to produce an output where price equals average cost,  $y_{AC}$ , then it will cover its costs, but will produce too little output relative to the efficient amount.

- ▶ A **natural monopoly** occurs when a firm cannot operate at an efficient level of output ( $p = MC$ ) without losing money.
- ▶ If it is required to produce an output where  $p = AC$ , it will be inefficient.
- ▶ Many public utilities are natural monopolies of this sort and are therefore regulated by the government.



*Thank You!*