

Topic 4B: Monopoly

Business Economics, Organization, and Management
(BUEC 211)

James Macek

Alberta School of Business
University of Alberta

Definition: Monopoly

A **monopoly** is the sole supplier of a good for which there is no close substitute.

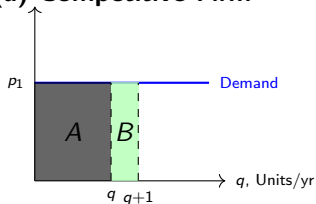
- Like a perfectly competitive firm, a monopoly maximizes profit by setting

$$MR(Q) = MC(Q).$$

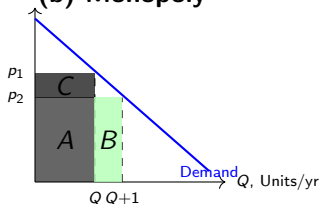
- **Key difference:** A monopoly faces a *downward-sloping* market demand curve — it has no competitors.
- This means a monopoly can alter its revenue by changing the price it charges.
- But there is a **trade-off** from lowering price:
 - Selling more units raises revenue.
 - But all previous units must now be sold at the lower price, reducing revenue.

Monopoly vs. Competitive Firm: Revenue Comparison

(a) Competitive Firm



(b) Monopoly



	R_1	R_2	$MR = R_2 - R_1$
Competition	A	$A + B$	$B = p_1$
Monopoly	$A + C$	$A + B$	$B - C = p_2 - p_1$

Note:

The monopolist's $MR < p$ because lowering price to sell one more unit reduces revenue on *all* previous units.

Price vs. Marginal Revenue

- A monopoly's **marginal revenue** from **selling** an additional unit must be **less than** the **price** of that unit.
- The MR curve lies *below* the demand curve for any Q ; its shape depends on the demand curve.
- In general:

$$MR = p + \left[\frac{\Delta P}{\Delta Q} \right] Q$$

where $\frac{\Delta P}{\Delta Q} < 0$.

- Recall that we can describe how price-responsive consumers are using the **price elasticity of demand**:

$$\varepsilon = \left[\frac{\Delta Q/Q}{\Delta P/P} \right] < 0$$

- ε indicates the percentage change in quantity demanded from a 1% change in price.

Inelastic demand: $-1 < \varepsilon \leq 0$

Elastic demand: $\varepsilon < -1$

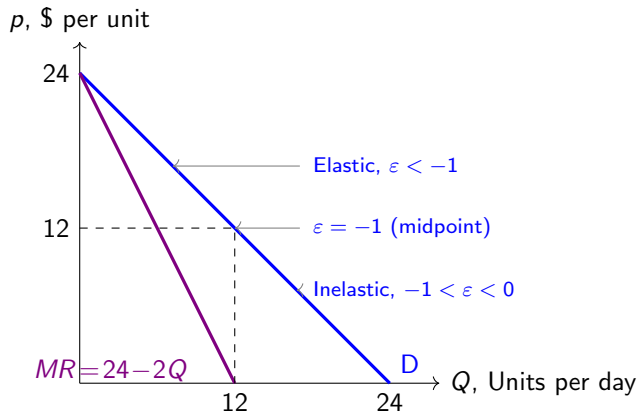
- Combining the MR formula with the elasticity definition:

$$\begin{aligned}MR &= P + \left[\frac{\Delta P}{\Delta Q} \right] Q = P + P \left[\frac{\Delta P}{\Delta Q} \right] \frac{Q}{P} \\&= P \left[1 + \frac{1}{\left[\frac{\Delta Q}{Q} \right] / \left[\frac{\Delta P}{P} \right]} \right] \\&= P \left[1 + \frac{1}{\varepsilon} \right]\end{aligned}$$

Implication

A profit-maximizing monopolist *always* operates in the elastic portion of demand ($MR = MC \geq 0 \Rightarrow \varepsilon \leq -1$).

Marginal Revenue Curve: Example with demand $p = 24 - Q$



Aside: Marginal Revenue for Linear Demand

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Monopoly Profit Maximization: Setting $MR = MC$

- A monopolist maximizes profit such that $MR(Q) = MC(Q)$.
- This can be achieved by adjusting either price or quantity — the other variable is determined by the demand curve.
- We focus on the case where the monopolist **chooses quantity**.

Two-Step Analysis

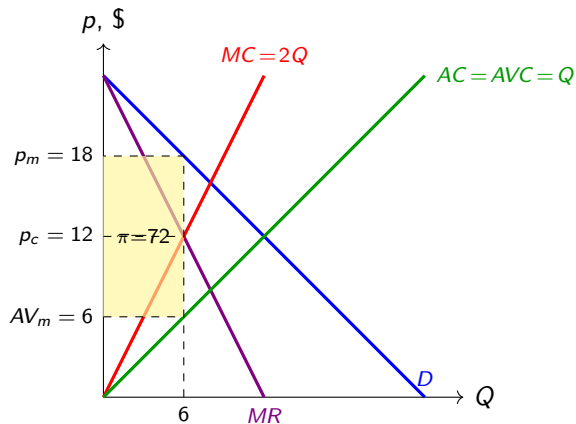
Step 1: Choose Q to maximize profit

Set $MR(Q) = MC(Q)$.

Step 2: Decide whether to produce or shut down

- **Short run:** Shut down if $p < AVC$.
- **Long run:** Shut down if $p < AC$.

Monopoly Profit Maximization with $C(Q) = Q^2$, and demand $p = 24 - Q$



Set $MR = MC$:

$$24 - 2Q = 2Q \Rightarrow Q^* = 6, \quad P^* = 18$$

	Formula	Value
TR	$P \times Q$	$18 \times 6 = 108$
TC	Q^2	$6^2 = 36$
VC	TC (since $FC = 0$)	36
FC	—	0
π	$TR - TC$	$108 - 36 = 72$

Market Power

Market Power

Market power is a firm's ability to affect the market price.

- The shape of the demand curve constrains a monopoly's ability to exercise market power.
- Profit maximization implies $MR = MC$. Since $MR = P[1 + \frac{1}{\varepsilon}]$:

$$\frac{P}{MC} = \frac{1}{1 + [1/\varepsilon]}$$

- A monopoly's **markup increases** as demand becomes **more inelastic**.

- We measure market power using the **Lerner Index**:

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

- Re-expressed in terms of elasticity:

$$LI = \frac{P - MC}{P} = -\frac{1}{\varepsilon}$$

- For a monopoly, the Lerner Index ranges between **0 and 1**.
 - $LI = 0$: perfect competition (no market power).
 - $LI \rightarrow 1$: very high market power (highly inelastic demand).

Market Power: Practical Use of Markup Rule

- Firms can exploit the relationship between markups and elasticity to ensure profits are maximized.
- If profit is maximized, then:

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

- With an estimate of ε , a firm can check whether $P/MC \approx 1/[1 + (1/\varepsilon)]$.
- If it is not, **prices need to be adjusted**.

Determinants of Market Power

Market power depends on the availability of substitutes, the number of firms, and the proximity of competitors — all factors that affect demand elasticity.

Market power is lower if:

- **Better substitutes exist** $\Rightarrow$ demand is more elastic.
- **More firms in the market** $\Rightarrow$ more consumer choice $\Rightarrow$ more elastic demand.
- **Competitors locate nearby** $\Rightarrow$ demand is more elastic.

Market Failure Due to Monopoly Pricing

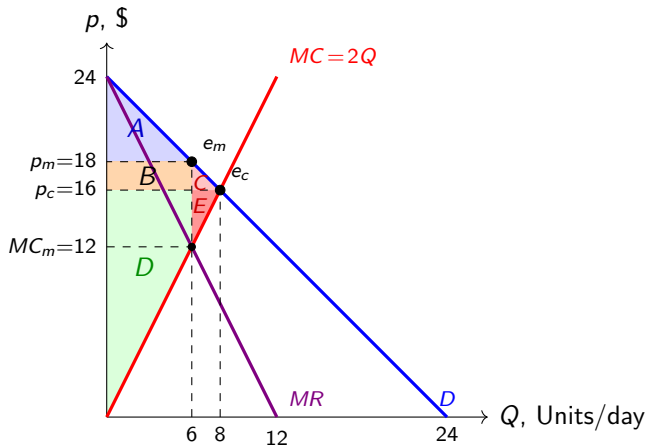
Monopoly Creates Market Failure

- **Recall:** Perfect competition achieves economic efficiency — it maximizes total surplus.
- **Market failure:** A non-optimal allocation of goods and services (in this case, production levels are such that prices $\neq$ marginal cost)
- A monopoly is **economically inefficient:**

A monopolist sets $P > MC$, so consumers buy *less* than the efficient quantity at higher prices than the efficient price level.

This wastes potential surplus — resulting in **deadweight loss (DWL)**.

Deadweight Loss from Monopoly when $MC = 2Q$, and demand $p = 24 - Q$



	Comp.	Mono.	Δ
CS	$A+B+C$	A	$-B-C$
PS	$D+E$	$B+D$	$+B-E$
TS	$A+B+C$ $+D+E$	$A+B$ $+D$	$-(C+E)$
DWL		$C+E$	

Key Result

Monopoly transfers surplus from consumers to the producer and creates $DWL = C + E$.

Causes of Monopoly

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Monopolies arise from two main factors:

1. Cost Considerations

- Cost advantages
- Natural monopoly

2. Government Policy

- Barriers to entry
- Patents

Causes of Monopoly: Cost Considerations

- **Cost advantages:** One firm has substantially lower costs than rivals.
Can price below rivals' break-even, deterring entry.
Sources: superior technology, better methods, control of an essential resource.
- **Natural monopoly:** One firm can produce the total market output at *lower* cost than two or more firms:

$$C(Q) < C(q_1) + C(q_2) + \cdots + C(q_N)$$

Arises due to **economies of scale** — a strictly declining average cost curve.

Governments use this argument to grant monopoly rights to public utilities.

- **Barriers to entry:**

Governments can require licenses to operate, or explicitly grant monopoly rights to a single firm (e.g., taxis, banks).

If the government auctions monopoly rights, it may capture some of the monopoly earnings — though rarely all future profits.

- **Patents:**

Exclusive rights granted to a patent holder for a specified period.

Granted only for new and useful products, processes, substances, or designs.

Typical length: **20 years** in both Canada and the United States.

Examples: pharmaceuticals, semiconductor chips.

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 - But, patents also gives other firms incentive to secure patents that render current technologies **obsolete**. This is a negative effect economists call **business stealing**.

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 - But, patents also gives other firms incentive to secure patents that render current technologies **obsolete**. This is a negative effect economists call **business stealing**.
- These are all ideas credited in part to Phillipe Aghion and Peter Howitt. This won them the 2025 Nobel Prize in Economics.

1. A profit-maximizing monopolist earns positive profit by choosing output to equate **marginal revenue** and **marginal cost**.
2. **Market power** depends on the shape (elasticity) of the demand curve.
3. **Monopoly leads to market failure** — it creates deadweight loss relative to perfect competition.
4. Monopolies can arise due to **cost advantages**, **government policy**, and **network effects**.