

ECO101: Introduction to Microeconomics

Lectures 16-17

Monopoly

A market structure where one firm produces a good or a service with no close substitutes

Characteristics of a monopoly

- A single producer – no competition
- Good or service has no close substitutes
- Barriers to entry into the market exist
- Firm is a price-maker or a price-setter

Monopoly

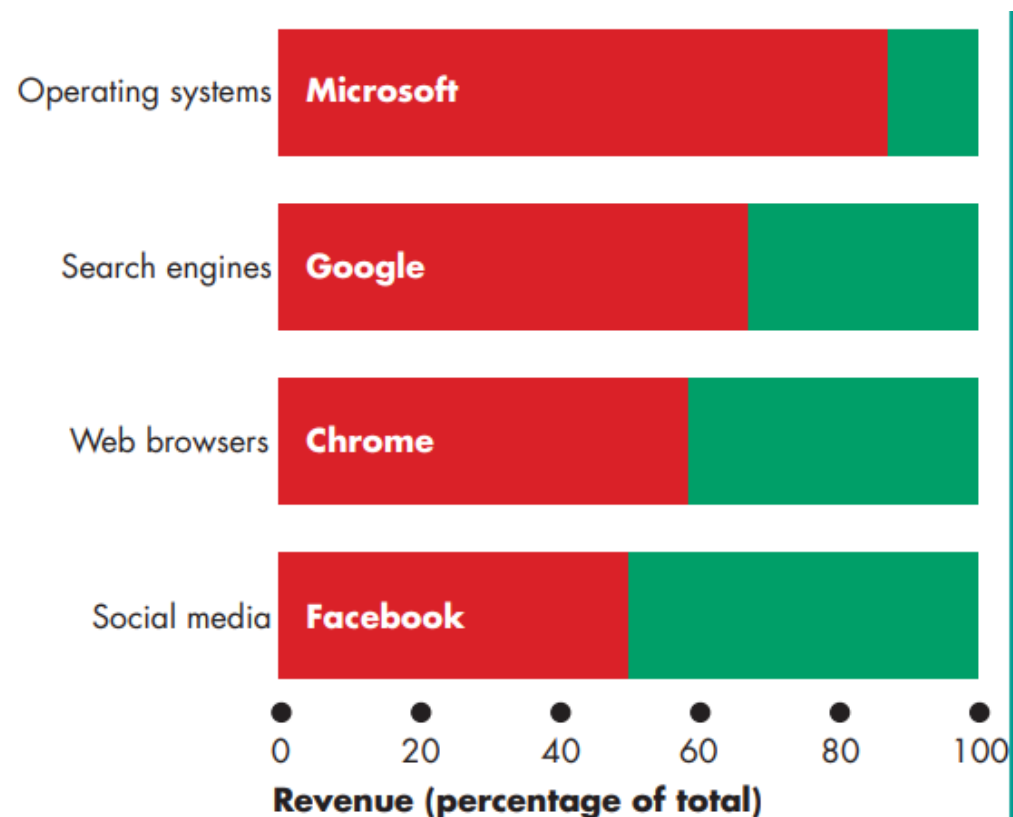


Figure 1 Market Shares

- In reality, a company does not need to have 100% market share to operate like a monopoly
- A single company can have a huge share in the industry in which it operates, allowing it to behave like a monopoly
- e.g. Google as a search engine platform, Facebook as a social media platform
- These are sometimes called “Information-Age Monopolies”
- These firms had large initial fixed costs (startup costs) but have almost zero marginal costs – natural monopolies

Monopoly

Different types of barriers to entry

1. Natural barriers to entry:

- a natural monopoly is created in a market in which economies of scale enable one firm to supply the entire market at the lowest possible cost
- can arise due to high startup costs/fixed costs
- can arise due to economies of scale – a large output is needed to be produced to recover fixed costs
- e.g. Bangladesh WASA (costly to set up water supply system but marginal cost to supply an additional household is practically zero)

2. Legal barriers to entry

- some monopolies may be protected by legal barriers to entry such as government license, patent or a monopoly franchise
- ensures that firms are motivated to innovate and invest in costly and time-consuming research and development
- Patents give firms the exclusive right to produce and sell a particular product for a given time period
- e.g. a patent for a malaria vaccine

Monopoly

A monopolist is a price-maker. It can use different price-setting strategies:

1. Single Price Monopoly

A single-price monopoly is a monopoly that must sell each unit of its output for the same price to all its customers

2. Price-discriminating Monopoly

A price-discriminating monopoly charges different prices for different units of a good/service.

Might charge different prices to different consumers as well (e.g. different age-groups are often charged different prices for entry tickets at a museum/fair)

Monopoly

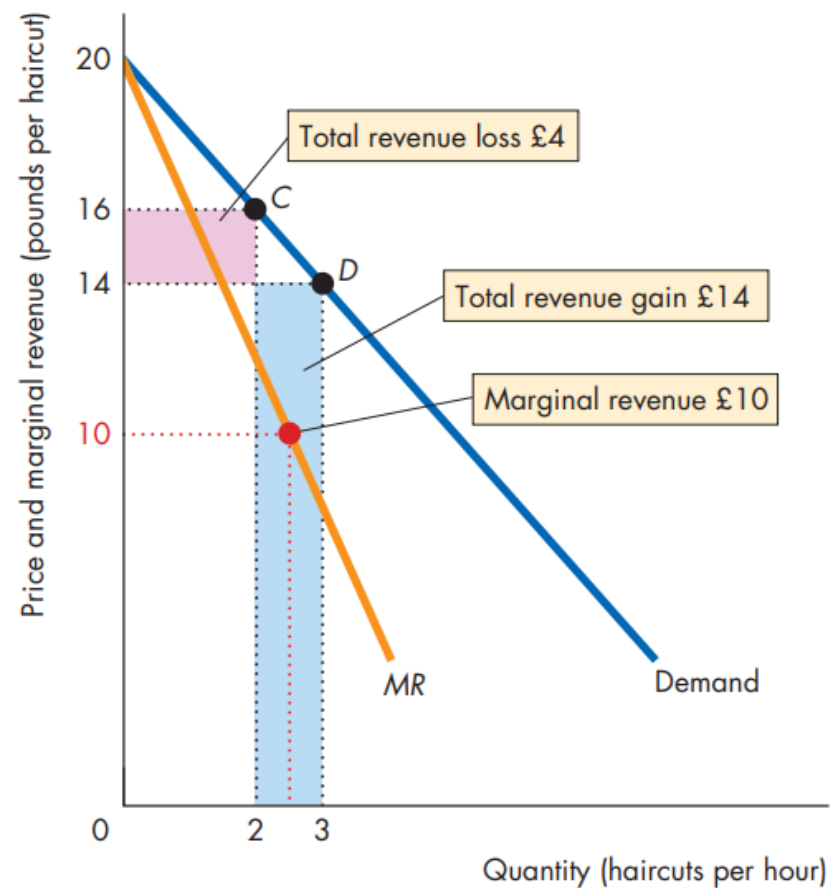
- Recall, a perfectly competitive firm faces a perfectly elastic demand curve
- For a monopoly, the demand curve it faces is the **same as the market demand curve** (the monopoly is the entire market – no other producers)
- Demand is usually downward sloping – as you decrease price, quantity demanded increases (law of demand)
- A monopolist faces a trade-off between the price it charges and the quantity sold. In order to sell more, it needs to reduce its prices

Monopoly

Relationship between Price & Marginal Revenue

- Let's look at the demand curve for Gina's Cut and Dry, the only hairdressing salon within a 15 mile radius of a North Yorkshire town.
- In order to sell more haircuts per hour, Gina needs to lower her price
- Recall, **Total Revenue = Price X Quantity**
- **Marginal revenue** is the change in total revenue that results from a one unit increase in quantity sold
- Note that for each output level, marginal revenue is lower than the price (i.e. the MR curve lies below the demand curve)
- When the price is lowered to sell one more unit, **two opposing forces** affect total revenue.
- The lower price results in a revenue loss and the increased quantity sold results in a revenue gain.

Figure 12.2 Demand and Marginal Revenue



Monopoly

Relationship between Price & Marginal Revenue

- For example, at a price of £16, Gina sells 2 haircuts (point C).
- If she lowers the price to £14, she sells 3 haircuts (point D)
- This means she has a revenue gain of £14 on the third haircut which is equal to the new price.
- But she now receives only £14 on the first two as well – £2 less than before.
- She loses £4 of revenue on the first 2 haircuts.
- To calculate marginal revenue, she must deduct this amount from the revenue gain of £14.
- So her marginal revenue is £10, which is less than the price (£14).

	Price (<i>P</i>) pounds per haircut)	Quantity demanded (<i>Q</i>) (haircuts per hour)	Total revenue (<i>TR</i> = <i>P</i> × <i>Q</i>) (pounds)	Marginal revenue (<i>MR</i> = $\Delta TR / \Delta Q$) (pounds per haircut)
A	20	0	0	
				..... 18
B	18	1	18	
				..... 14
C	16	2	32	
				..... 10
D	14	3	42	
				..... 6
E	12	4	48	
				..... 2
F	10	5	50	

Monopoly

Relationship between Price & Marginal Revenue

Imagine demand function is given by:

$$Q = 24 - P$$

Rearrange to write the demand function in terms of P (Monopolists choose price):

$$P = 24 - Q$$

We know:

$$\begin{aligned} TR &= PXQ \\ TR &= (24 - Q)Q \\ TR &= 24Q - Q^2 \end{aligned}$$

To find Marginal Revenue, simply differentiate the Total Revenue (TR) function with respect to Q

$$MR = \frac{dTR}{dQ} = 24 - 2Q$$

For any linear demand curve, MR curve has twice the slope of the Demand curve

Marginal Revenue & Elasticity

Recall, Why do firms care about PED?

- A rise in price causes quantity demanded to decrease (law of demand)
- Does a rise in price cause total revenue earned by a firm to increase?
- **Total Revenue = Price X Quantity Sold**
- Change in revenue depends on the elasticity of demand

Suppose a hair stylist is considering increasing the price of haircuts from \$25 to \$35. At \$25 per haircut, the stylist usually sells 15 haircuts in one day. With the new price, she will end up losing a few clients – but will she still be earning more?

Recall, the Total Revenue test

Change in total revenue due to a change in price depends on the elasticity of demand

If demand is elastic, a 1 percent price increase reduces quantity demanded (and thus the quantity sold) by more than 1 percent, and total revenue decreases.

If demand is inelastic, a 1 percent price increase reduces quantity demanded (and thus the quantity sold) by less than 1 percent, and total revenue increases.

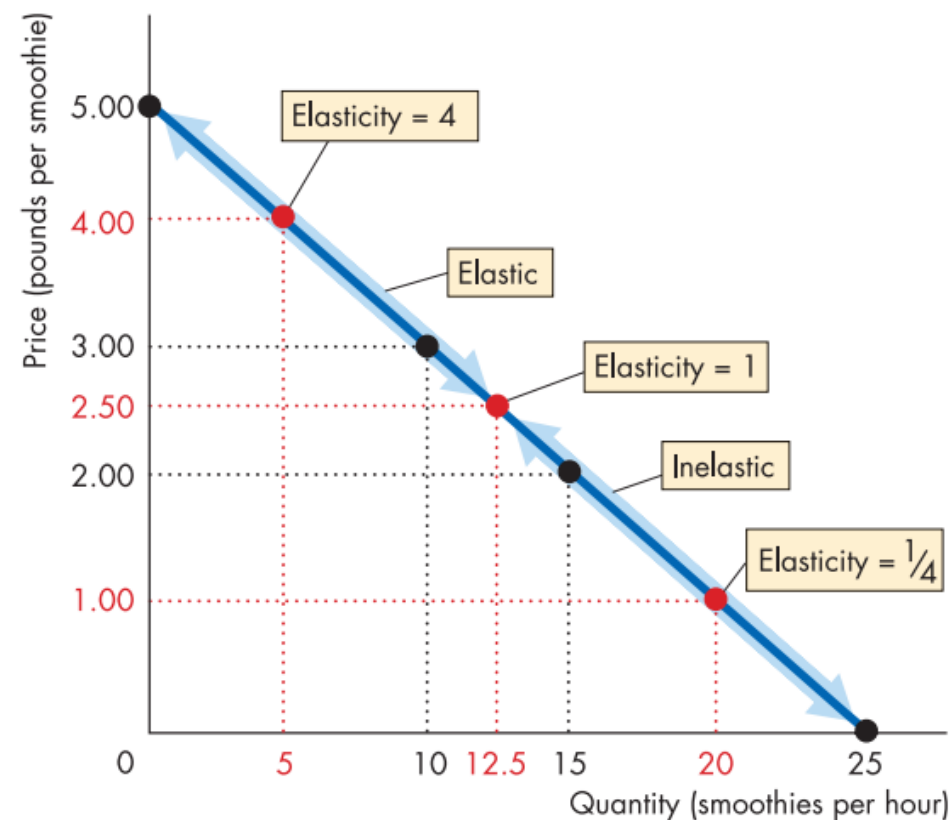
If demand is unit elastic, a 1 percent price increase changes the quantity sold by 1 percent and the revenue remains unchanged.

Recall, Elasticity along a linear demand curve

Figure shows how the elasticity of demand changes along a linear demand curve.

- Demand is unit elastic at the mid-point of the demand curve i.e. $\text{elasticity} = 1$
- At prices above the mid-point, demand is elastic
i.e. $\text{elasticity} > 1$
- At prices below the mid-point, demand is inelastic
i.e. $\text{elasticity} < 1$

Elasticity Along a Linear Demand Curve

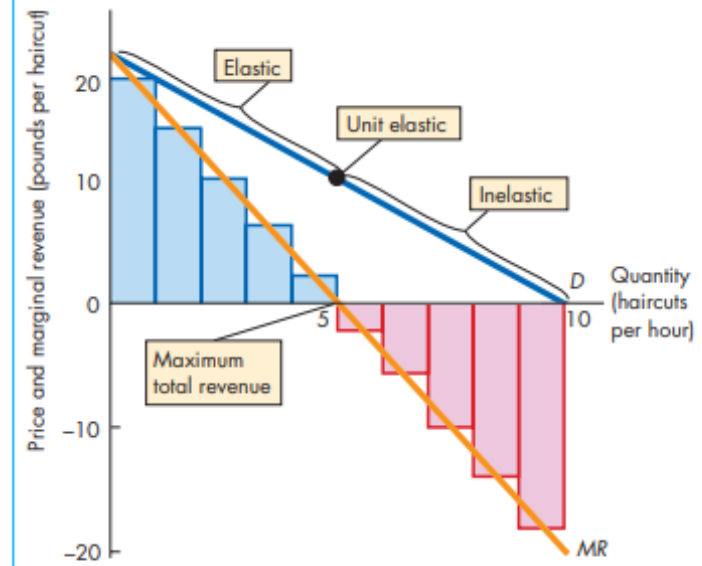


Marginal Revenue & Elasticity

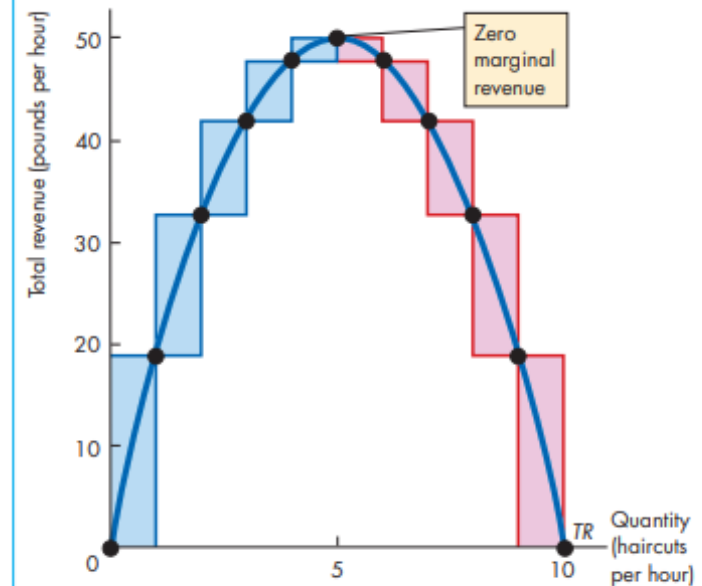
- If demand is **elastic**, a fall in price brings an increase in total revenue – the increase in revenue from the increase in quantity sold outweighs the decrease in revenue from the lower price – and **marginal revenue is positive**.
- If demand is **inelastic**, a fall in the price brings a decrease in total revenue – the increase in revenue from the increase in quantity sold is outweighed by the decrease in revenue from the lower price – and **marginal revenue is negative**.
- If demand is **unit elastic**, total revenue does not change – the increase in revenue from the increase in quantity sold offsets the decrease in revenue from the lower price – and **marginal revenue is zero**.

Marginal Revenue & Elasticity

- Over the range of 0 to 5 haircuts, the demand curve is elastic – a price cut increases TR – **MR is positive**
- Over the range of 5 to 10 haircuts, the demand curve is inelastic – a price cut decreases TR – **MR is negative**
- At 5 haircuts an hour, the demand curve is unit elastic – total revenue reaches its peak (maximum point) and **MR is zero** at this point
- This relationship implies that a profit-maximizing monopoly never produces an output in the inelastic range of its demand curve.



(a) Demand and marginal revenue curves



(b) Total revenue curve

Profit-Maximization for a Monopoly

Table 12.1

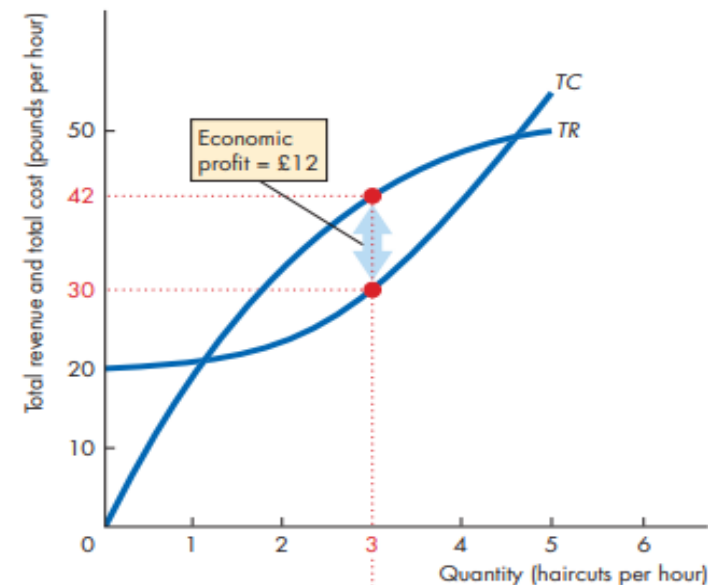
A Monopoly's Output and Price Decision

Price (P) (pounds per haircut)	Quantity demanded (Q) (haircuts per hour)	Total revenue ($TR = P \times Q$) (pounds)	Marginal revenue ($MR = \Delta TR / \Delta Q$) (pounds per haircut)	Total cost (TC) (pounds)	Marginal cost ($MC = \Delta TC / \Delta Q$) (pounds per haircut)	Profit ($TR - TC$) (pounds)
20	0	0		20		-20
			.....18		.....1	
18	1	18		21		-3
			.....14		.....3	
16	2	32		24		8
			.....10		.....6	
14	3	42		30		+12
			.....6		.....10	
12	4	48		40		+8
			.....2		.....15	
10	5	50		55		-5

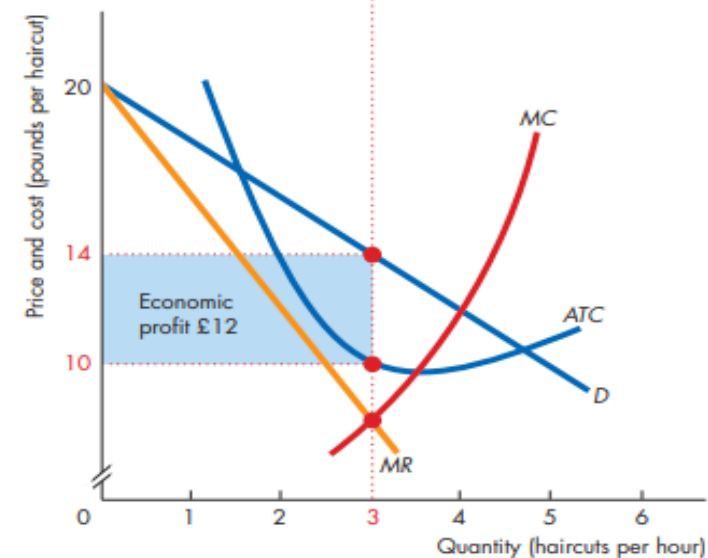
- A monopoly will set its price and output at a level that maximizes its profits
- Profit = $TR - TC$
- Cost functions are same as we saw for a perfectly competitive firm
- We have seen how revenue, MR differs for a monopolist

Profit-Maximization for a Monopoly

- We can see from Panel A that TR increases at a decreasing rate while TC increases at an increasing rate
- Economic profits are maximized when the firm produces 3 haircuts an hour
- We know all firms maximize profits at the output where $MR = MC$
- Recall, for a perfectly competitive firm, Price equals MR which means Price = MC
- For a monopoly, price exceeds MR (MR lies below the demand curve). This implies price exceeds MC as well.



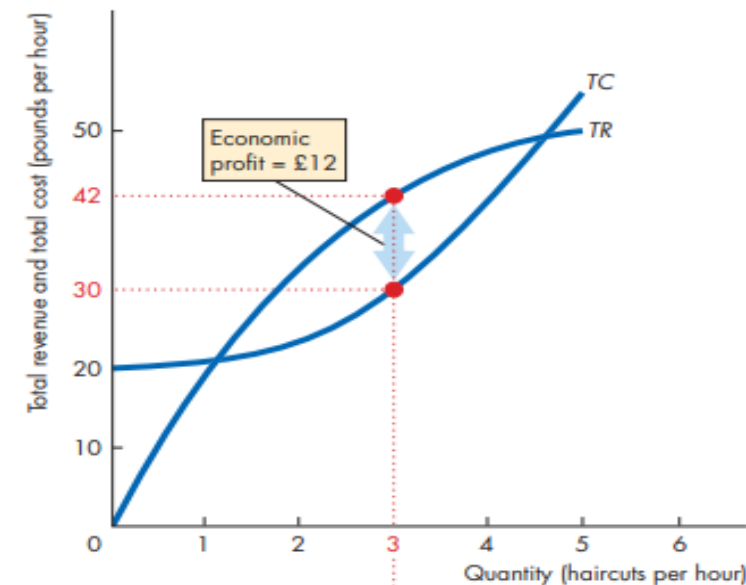
(a) Total revenue and total cost curves



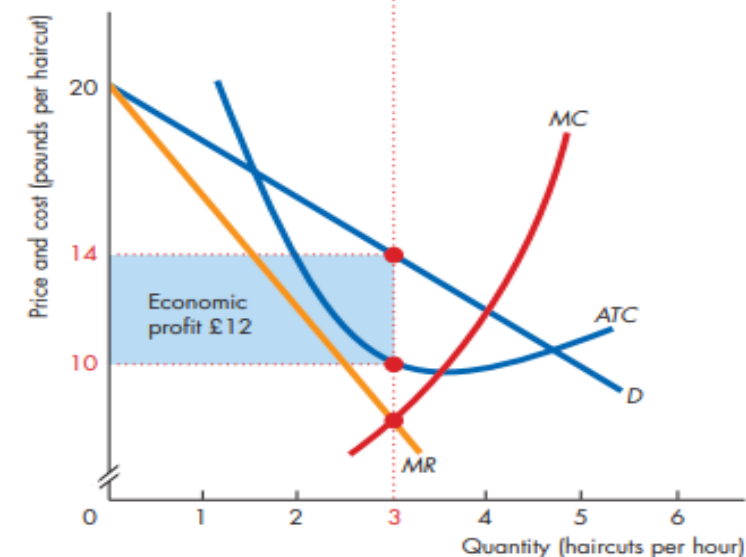
(b) Demand and marginal revenue and cost curves

Profit-Maximization for a Monopoly

- From the graph, we can see that at the profit maximizing level of output (3 haircuts), monopolist is charging a **price = £14**
- However, at this output level, **ATC = £10**
- So for each unit produced, **profit = £4**
- **Total profits = 3 X £4 = £12 (blue shaded region)**
- If firms in a perfectly competitive market make a positive economic profit, new firms enter.
- In a monopoly, barriers to entry prevent new firms from entering a market.
- So a monopoly can make a positive economic profit and might continue to do so indefinitely.



(a) Total revenue and total cost curves



(b) Demand and marginal revenue and cost curves

Single-price Monopoly VS Perfect Competition

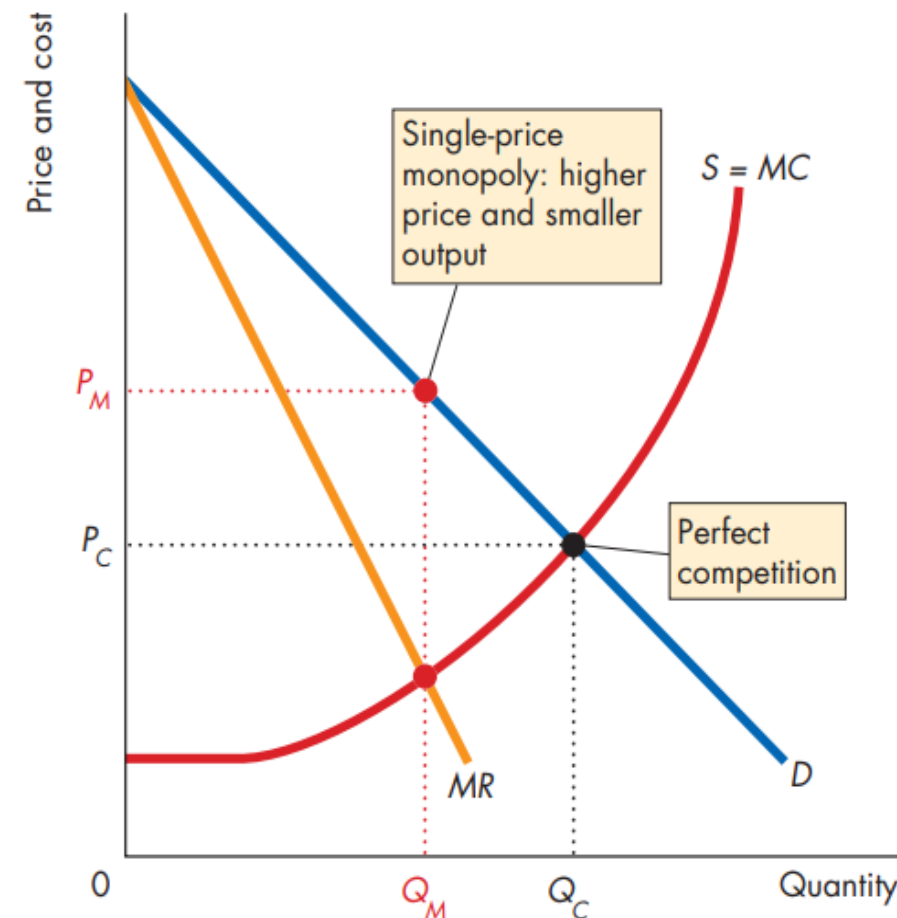
Perfect Competition

- The demand curve represents the overall market demand for the good. The supply curve represents the total supply in the market (supply across all firms combined)
- Under perfect competition, the quantity produced is Q_c and the price is P_c .

Monopoly

- In this case, since the monopoly is the only firm in the industry, the monopoly's MC curve is the same as the market supply curve.
- The monopoly maximizes profit by producing the quantity at which marginal revenue equals marginal cost.
- Under monopoly, the quantity produced is Q_M and the price is P_M .

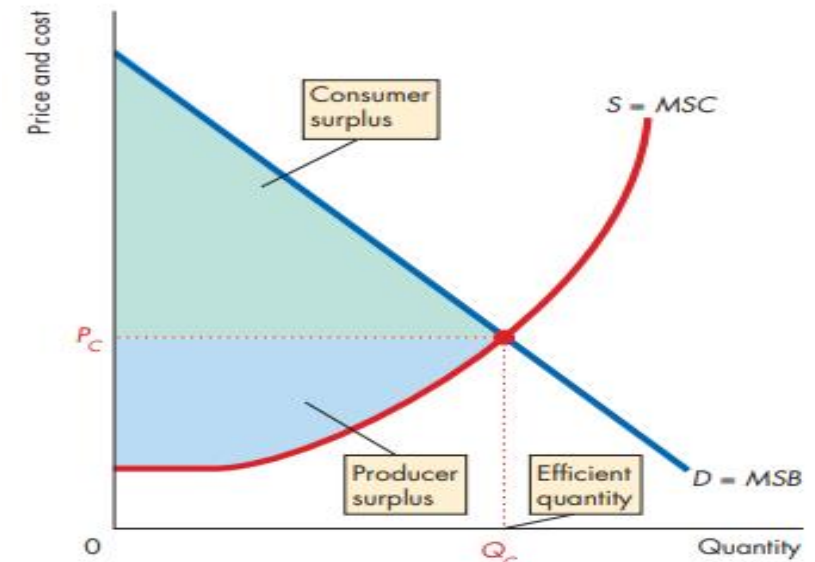
Compared with a perfectly competitive market, a single-price monopoly produces a smaller output and charges a higher price.



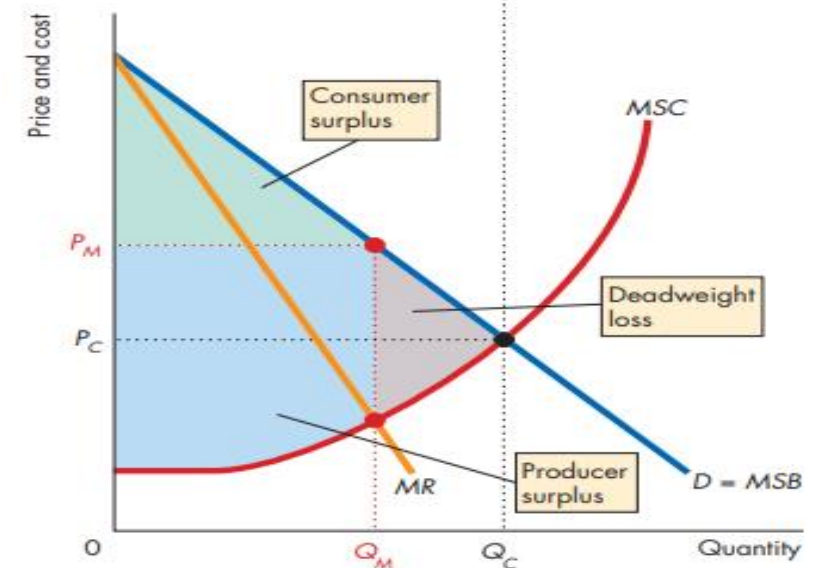
Single-price Monopoly VS Perfect Competition

Efficiency Comparisons

- Panel A shows that the output produced by a perfectly competitive firm is efficient.
- Consumer surplus is represented by the green triangle and Producer surplus is represented by the blue triangle
- Under perfect competition, total surplus is maximized
- A monopoly charges a higher price and restricts output at Q_M . This leads to a **deadweight loss (grey triangle)**
- Consumer surplus shrinks. A portion of this loss to consumers is a gain for the monopoly and increases the monopoly's producer surplus.
- Consumers also lose by getting less of the good, and this loss is part of the deadweight loss created by monopoly.
- Although the monopoly gains from a higher price, it loses some producer surplus because it produces a smaller output. That loss is another part of the deadweight loss created by monopoly.



(a) Perfect competition



(b) Monopoly