

2.11 Market failure – market power (HL only)



2.11 Market failure – market power (HL only)	Depth	Diagrams and calculations
Perfect competition – many firms, free entry, homogeneous products	AO2	
Monopoly – single or dominant firm, high barriers to entry, no close substitutes		
Imperfect competition		
 Oligopoly – few large firms, high barriers to entry, interdependence 		
 Monopolistic competition – many firms, free entry, product 		
differentiation		



2.11 Market failure – market power (HL only)		Diagrams and calculations
Rational producer behavior – profit maximization (HL only)	AO2	Calculation (HL only):
 Total revenue – Total costs (TR – TC) 	AO4	Profit
 Marginal cost = Marginal revenue (MC = MR) 		• MC
 Abnormal profit (AR > AC)* 		• MR
 Normal profit (AR = AC)* 		• AC
 Losses (AR < AC)* 		• AR
 * AR = Average revenue, AC = Average cost 		from data

2.11 Market failure – market power (HL only)	Depth	Diagrams and calculations
Degrees of market power	AO3	Diagram: perfectly competitive firm as price taker where,
Meaning of market power	AO 4	*P = D = AR = MR
 Perfect competition – no market power – firm as price taker 		Diagram: perfectly competitive firm showing:
 profit maximization: in the short run 		 abnormal profit normal profit
 in the long run 		• losses Diagram: equilibrium in perfectly
Meaning of allocative efficiency, necessary		competitive market with reference to allocative efficiency when P =
conditions		MC or MB = MC, maximum social/
 Imperfect competition – varying degrees of 		community surplus.
market power – firm as price maker		*P = Price, D = Demand



MonopolyAO3Diagram: market power where AR > MC• Profit maximizationAO4Diagram: monopolist showing: • abnormal profit • normal profit • losses• Welfare loss in a monopoly in comparison with perfect competition due to restricted output and higher price • Natural monopolyDiagram: price/quantity comparison of a monopoly firm with a perfect competitive market. Also showing welfare loss under the monopoly.• Natural monopolyDiagram: natural monopoly	2.11 Market failure – market power (HL only)	Depth	Diagrams and calculations
	 Monopoly Profit maximization Allocative inefficiency (market failure) Welfare loss in a monopoly in comparison with perfect competition due to restricted output and higher price Natural monopoly 	AO3 AO4	 Diagram: market power where AR > MC Diagram: monopolist showing: abnormal profit normal profit losses Diagram: price/quantity comparison of a monopoly firm with a perfect competitive market. Also showing welfare loss under the monopoly. Diagram: natural monopoly

OligopolyAO3Diagram: collusive• Collusive versus non-collusiveAO4AO4Diagram: collusive oligopoly acting as a monopoly• Interdependence, risk of price war, incentive to collude, incentive to cheatAO4Diagram: collusive oligopoly acting as a monopoly• Allocative inefficiency (market failure) • simple game theory payoff matrixImage: AD4Image: AO4Diagram: collusive oligopoly acting as a monopoly	2.11 Market failure – market power (HL only)	Depth	Diagrams and calculations
 Measurement of market concentration – concentration ratios 	 Oligopoly Collusive versus non-collusive Interdependence, risk of price war, incentive to collude, incentive to cheat Allocative inefficiency (market failure) simple game theory payoff matrix Price and non-price competition Measurement of market concentration – concentration ratios 	AO3 AO4	Diagram: collusive oligopoly acting as a monopoly



2.11 Market failure – market power (HL only)	Depth	Diagrams and calculations
 Monopolistic competition Profit maximization: in the short run in the long run Less market power due to many substitutes – more elastic demand curve compared with monopolyAllocative inefficiency (market failure)Less inefficiency, more product variety	AO3 AO4	Diagram: monopolistically competitive firm showing: • abnormal profit • normal profit • losses Diagram: monopolistic competition (with a more elastic demand curve compared to a monopoly)

2.11 Market failure – market power (HL only)	Depth	Diagrams and calculations
Advantages of large firms having significant market power, including:	AO3	
 Economies of scale including natural monopolies 		
 Abnormal profits may finance investments in R&D, hence innovation 		
Risks in markets dominated by one or a few very large firms		
 Risks in terms of output, price, consumer choice 		
Government intervention in response to abuse of significant market		
power		
Legislation and regulation		
Government ownership		
• Fines		



Starter

In groups, prepare a presentation which outlines the following:

- 1. Identify 3 businesses that operate in a market with high levels of competition.
- 2. Identify 3 businesses that operate in a market with a low levels of competition.
- 3. With reference to your examples, outline the advantages and disadvantages of competition to consumers, firms, and the economy.



Introduction

Market power refers to a firm's ability to control the price of a product. Based on a firm's level of market power, markets can be categorized into **market structures**. Every market structure is determined by the following three factors:







The number and size of firms in the market

The barriers to entry of a market

The level of price and non-price competition



Market Power

The market power of firms can be categorised into the following market structures:

- Perfect Competition
- Imperfect Competition
 - Monopolistic Competition
 - Non-collusive oligopolies
 - Collusive oligopolies and Monopolies
 - Pure Monopolies



As a result of this, market power is sometimes known as monopoly power.





Real world example – Mass Transit Railway Corporation

Residents of Hong Kong often use the Mass Transit Rail to commute and travel, with over 5.9 million travelers every day. What are the benefits of the MTRC having significant market power?



Key Terms and Formulas

Term	Definition	Formula
Total revenue	Overall amount of money received by a firm for selling its output	$TR = P \times Q$
Average revenue	Per-unit amount of money received by a firm for selling its output (i.e. the price of the good)	$AR = \frac{TR}{Q} = \frac{P \times Q}{Q} = P$
Marginal revenue	The extra revenue received by selling an extra unit of output	$MR = \frac{\Delta TR}{\Delta Q}$



Key Terms and Formulas

Term	Definition	Formula
Economic costs or Total costs	Money payments to buy resources plus the opportunity cost of using self-owned resources or total production costs incurred by a firm	Economic costs = explicit costs + implicit costs or TC = ATC×Q
Average total costs	The total cost of producing one unit of a good/service at a given level of output	$ATC = \frac{TC}{Q}$
Marginal costs	The extra costs incurred by producing an extra unit of output	$MC = \frac{\Delta TC}{\Delta Q} = \frac{\Delta TVC}{\Delta Q}$



Key Terms and Formulas

Term	Definition	Formula
Profit (π)	The difference between total revenue and total costs	$\pi = TR - TC$
Profit level	Condition	
Economic/Supernormal/ Abnormal Profit	Where total revenue exceeds total costs	TR > TC or P > AC
Normal Profit	Where the cost of production is equal to total costs	TR = TC or P = AC
Economic Loss	Where total revenue is less than total costs	TR < TC or P < AC



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Profit maximisation



Therefore, profit is maximised when marginal revenue (MR) is equal to marginal costs (MC).



Mathematical proof for profit maximisation (supplementary)

$$\pi = TR - TC$$

$$\frac{d}{dQ}(\pi) = \frac{d}{dQ}(TR - TC) = \frac{d}{dQ}(TR) - \frac{d}{dQ}(TC)$$

$$\frac{d\pi}{dQ} = \frac{dTR}{dQ} - \frac{dTC}{dQ} = MR - MC$$
Profit is maximised when $\frac{d\pi}{dQ} = 0$:
$$MR - MC = 0$$

$$MR = MC$$



Cost curves of a firm

Due to specialization and the law of diminishing marginal returns, the **marginal cost** of a firm varies with output:

- Up to point a, marginal costs fall as specialization improves the efficiency of factors of production.
- Beyond point **a**, marginal costs increase due to the law of diminishing marginal returns.





Cost curves of a firm

These factors also lead the (short-run) average

total cost curve to be U-shaped (parabolic).

Furthermore, the marginal cost curve intersects the average total cost curve at its minimum.

- When MC < ATC, an additional unit of output will decrease ATC.
- When MC > ATC, an additional unit of output will increase ATC.
- Productive efficiency is reached at MC = ATC.





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Perfect competition are markets which display the following characteristics:

- Many small firms
- Homogeneous products (perfect substitutes)
- No market power (firms are price takers)
- No barriers to entry or exit
- Perfect information
- Perfect factor mobility



Can you think of any markets which display these characteristics in the real world?



Characteristics of Perfect Competition

Many small firms, no market power (firms are price takers)

- There are many buyers and sellers in perfect competition.
- No one firm is large enough to affect the market.

Homogeneous products (perfect substitution)

- Firms produce identical products and one firm's product is just as good as another's.
- Hence, there is no incentive to advertise as it would only increase costs (the exception being industry-wide advertising).
- Furthermore, one firm's product is a perfect substitute for another's. As such, the demand curve faced by a firm is **perfectly price elastic**.



Characteristics of Perfect Competition

No barriers to entry or exit

- Firms can enter and leave the industry at will, without costs.
- As a result, due to market forces, firms will always earn normal profit in the long run.

Perfect information

- Potential & existing producers have perfect information on the costs and revenues of producers.
- Buyers are aware about the industry and that products are homogeneous.

Perfect factor mobility

• Factors of production can be moved in and out of production freely.



As firms have no market power, the demand curve they face is perfectly elastic. The demand and price for an individual firm is determined by market demand and market supply.







In the case of perfect competition, as D = AR is

perfectly elastic, it is also equal to the price at all levels of output:

D = AR = P

In the case of a downward-sloping demand curve, the marginal revenue faced by a firm will fall as output increases. However, as the AR curve for perfect competition is perfectly elastic, this is not the case.



Recall the formula for marginal revenue:









Collating all the cost and revenue curves will allow us to examine the individual firm's profit at different levels of output.



Normal profit Due to the profit-maximizing assumption, firms Costs & ' Revenues (\$) MC will operate where MR = MC at P^* , Q^* . ATC Firms earn **normal profit** when ATC is at a P* tangent to the MR curve. MR = D = AR = PThis is because at (P^*, Q^*) , P = ATC and hence TR = TC. Q* Quantity

Perfect Competition – normal profit

When both total revenue and total costs are visualized, it becomes clear that TR = TC.





Perfect Competition – short-run economic profit

Due to the profit-maximizing assumption, firms Revenues (\$) will operate where MR = MC at P*, Q*.

Firms earn economic profit (or supernormal profit) when AR > ATC at the quantity where MR = MC.



Perfect Competition – short-run economic profit

When AR > ATC, TR > TC as shown below.





Perfect Competition – short-run economic profit

Hence, firms will earn economic profit (π).

Profit exists as TR > TC:

- Total Revenue $(P^* \times Q^*)$
- Total Costs (ATC × Q*)

As explored later, supernormal profit is not sustainable in the long run for a perfectly competitive firm.





Perfect Competition – short-run economic loss

Due to the profit-maximizing assumption, firms will operate where MR = MC at P^* , Q^* .

Firms will incur an **economic loss** when ATC > AR at the quantity where MR = MC.



Level7 Education
Perfect Competition – short-run economic loss

When ATC > AR, TC > TR as shown below.



Level7 Education

Perfect Competition – short-run economic loss

Hence, firms will incur an economic loss π .

An economic loss will not sustain itself in the long run for a perfectly competitive firm.





Perfect Competition – long run profits

Both economic profits and losses are **unsustainable** in the long run for a perfectly competitive firm.





Perfect Competition – long run supernormal profits

As potential producers have perfect information, they will enter the market to compete for economic profits.



Perfect Competition – long run supernormal profits

This increases the market supply and reduces the market price until all supernormal profits are competed away, resulting in normal profit.





Perfect Competition – long run economic loss

In the long run, rational producers making a loss will exit the market.





Perfect Competition – long run economic loss

As a result, market supply shifts inwards, raising market prices until economic losses disappear, returning every firm to a level of normal profit.





Evaluation of Perfect Competition – benefits

- Allocative efficiency
- Productive efficiency
- Low prices for consumers
- Competition leads to the closing down of inefficient producers
- The market responds to consumer tastes
- The market responds to changes in technology or resource prices.



Evaluation of Perfect Competition – drawbacks

- Unrealistic assumptions
- Limited possibilities to take advantage of economies of scale
- Lack of product variety
- Waste of resources in the process of long-run adjustment
- Limited ability to engage in research and development.





Test your knowledge on this unit: <u>Kahoot!</u>



Monopolistic Competition

Monopolistic competition are markets which display the following characteristics:

- Many firms
- Slightly differentiated products
- Insignificant market power (some price-setting power)
- Insignificant barriers to entry or exit
- Imperfect (close) substitutes exist



Can you think of any markets which display these characteristics in the real world?



Characteristics of Monopolistic Competition

Many firms

- There are many buyers and sellers in monopolistic competition,
- Firms are small to medium in size,

Slightly differentiated products, Imperfect (close) substitutes exist

- Firms produce similar products that are imperfect or close substitutes,
- Due to a slight level of product differentiation, there is a small incentive to advertise.



Characteristics of Monopolistic Competition

Insignificant market power (some price-setting power)

- Due to subtle product differentiation, firms will hold some market power.
- However, as substitutes are close in monopolistic competition, the demand curve faced by a firm is relatively price elastic. Hence, firms have less freedom to control prices without experiencing large changes in quantity demanded.

Insignificant barriers to entry or exit

- There are low levels of barriers to entry, although they are insignificant.
- As a result, due to market forces, firms will always earn normal profit in the long run.



Monopolistic Competition – demand curve faced by a firm



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Quantity

Mathematical proof for the relationship between AR and MR (supplementary)

The AR curve can be rewritten as AR: P = mQ + b.

Substituting P = mQ + b into the formula for TR:

$$TR = P \times Q = (mQ + b) \times Q = mQ^2 + bQ$$

$$\frac{d\mathrm{TR}}{d\mathrm{Q}} = \mathrm{MR} = 2\mathrm{m}\mathrm{Q} + \mathrm{b}$$

Hence, the MR curve is twice as steep as the AR curve.



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Monopolistic Competition – normal profit

Due to the profit-maximizing assumption, firms will operate at the quantity Q^* , where MR = MC.

The average revenue P* is then found by referring to the AR curve, at Q*.

Here, this firm is earning normal profit as AR = P = ATC and hence TR = TC.





Monopolistic Competition – normal profit

When both total revenue and total costs are visualized, it becomes clear that TR = TC.





Monopolistic Competition – short-run economic profit

Due to the profit-maximizing assumption, firms will operate where MR = MC, at P*, Q*.

The average revenue P* is found by referring to the AR curve, at Q*.

The average total cost is then found by referring to the ATC curve, at Q*.

Firms earn **supernormal profit** when AR > ATC at the quantity where MR = MC.



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Monopolistic Competition – short-run economic profit

When AR > ATC, TR > TC as shown below.





Monopolistic Competition – short-run economic profit

Hence, firms will earn economic profit π .

As explored later, supernormal profit is not sustainable in the long run for a monopolistically competitive firm.



Monopolistic Competition – short-run economic loss

Due to the profit-maximizing assumption, firms will operate where MR = MC at P^* , Q^* .

Firms will incur an economic loss when ATC > AR at the quantity where MR = MC.





Monopolistic Competition – short-run economic loss

When ATC > AR, TC > TR as shown below.





Monopolistic Competition – short-run economic loss

Hence, firms will incur an economic loss π

This is shown by the areas $(ATC - P^*) \times Q^*$

An economic loss will not sustain itself in the long run for a monopolistically competitive firm.



Monopolistic Competition – long run profits

Both economic profits and losses are unsustainable in the long run in monopolistic competition.





Monopolistic Competition – long run supernormal profits

As potential producers have perfect information, they will enter the market to compete for economic profits.

New firms increase the number of substitutes for any given individual firm, shifting the demand curve faced by an individual firm inwards.





Monopolistic Competition – long run supernormal profits

Overall, producers making economic profit in the short run will ultimately make normal profit in the long run.





Monopolistic Competition – long run economic loss

In the long run, rational producers making a loss will exit the market.

With less firms in the market, the number of substitutes for an individual firm falls, resulting in the demand curve faced by the individual firm to shift outwards.





Monopolistic Competition – long run economic loss

Overall, producers incurring an economic loss in the short run will ultimately make normal profit in the long run.





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Starter

Watch the video "Monopolies and Anti-Competitive Markets: Crash Course Economics #25"



Monopoly

Monopolies are the opposite of perfect competition on the market structure spectrum.

The characteristics of a monopoly include:

- A single or dominant firm
- Dominant power (price-makers)
- High barriers to entry (artificial or natural)
- No close substitutes



Can you think of any markets which display these characteristics in the real world?



A single or dominant firm

• A firm can be considered a monopolist if it has significant market share and is much larger than other firms in the market.

Dominant power (price-makers), No close substitutes

- Products in a monopoly are unique and there are no close substitutes.
- As a result, demand is relatively price inelastic and monopolists have the power to affect market prices by themselves.
- High degrees of market power allows them to make high levels of profits.



High barriers to entry

- Monopolists can earn supernormal profit in the long run due to high barriers to entry.
- Natural barriers to entry include:
 - Ownership of key factors of production
 - Economies of scale
 - Natural monopoly
- Artificial barriers to entry include:
 - Advertising
 - Patents
 - High costs of switching for the consumer.


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- [10 marks]





Monopoly – demand curve faced by a firm

Due to the lack of substitutes, the demand curve faced by a firm, or the AR curve, is downward-sloping and **relatively price inelastic**.

As with monopolistic competition, the MR curve is twice as steep as the AR curve.





Due to the profit-maximizing assumption, firms will operate at the quantity Q^* , where MR = MC.

The average revenue P* is then found by referring to the AR curve, at Q*.

This firm is earning **normal profit** as AR = P = ATC and hence TR = TC.



Monopoly – normal profit

When both total revenue and total costs are visualized, it becomes clear that TR = TC.





Due to the profit-maximizing assumption, firms will operate where MR = MC, at P*, Q*.

The average revenue P* is found by referring to the AR curve, at Q*.

The average total cost is then found by referring to the ATC curve, at Q*.

Firms earn **supernormal profit** when AR > ATC at the quantity where MR = MC.



When AR > ATC, TR > TC as shown below.



Hence, monopolists will earn economic profit π

This is shown by the area (P* – ATC) $\times\,Q^*$

Due to high barriers to entry, potential firms are unlikely to enter the industry to compete for economic profits. Hence, **a monopolist will continue to earn supernormal profits** *in the long run*.



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- [1 + 1 + 1 + 1 marks]





Monopoly – welfare loss in economic profit

Recall that:

- The AR curve can be viewed as the demand curve faced by a firm
- The MC curve can be viewed as the supply curve of a firm

Therefore, market equilibrium and allocative efficiency is achieved at (P_e , Q_e) when AR = P = MC, and hence MB = MC.



Monopoly – welfare loss in economic profit

At MR = MC, a monopolist is allocatively inefficient in the short run and long run.

Therefore, unlike in perfect competition, the market suffers from welfare loss to society:

- A loss in consumer surplus due to higher prices
- A loss in producer surplus due to restricted output

In perfect competition, MR = AR, and hence MC = MR = AR, or P = MC, which is why allocative efficiency is always reached. This is

not the case in imperfect competition.





Real world example – Luxottica

With 80% of market share in the eyewear industry, Luxottica's diverse portfolio includes brands such as Ray-Ban, Oakley, Costa del Mar, and many more licensed brands. Watch the video and answer the following questions on the next slide.





Real world example - watch from 7:20 to the end

- 1. Why is Luxottica referred to as a price-maker?
- 2. Would you consider Luxottica's actions as anti-competitive?



Monopoly – economic loss

Due to the profit-maximizing assumption, firms will operate where MR = MC, at P*, Q*.

Firms will incur an **economic loss** when ATC > AR at the quantity where MR = MC.



Monopoly – economic loss

When ATC > AR, TC > TR as shown below.



Monopoly – economic loss

Hence, monopolists will incur an economic loss (negative profit) π , shown by the area (ATC – P*) × Q*.

Due to high barriers to exit, a monopolist will continue to incur an economic loss *in the long run*.



Economies of scale is an example of a natural **barrier to entry**

In some cases, initial start-up costs are so high that a firm can only survive through economies of scale. Hence, this market structure is known as a **natural monopoly**.





As a result of these high costs, it is more efficient for one large firm to supply the entire industry, rather than two or more smaller firms.

Common examples of natural monopolies include transportation and utilities firms, such as railway, gas, and electricity providers.





Natural Monopoly – costs

Due to high start-up costs, average total costs are spread throughout a much larger range of output.





Profit Maximising Natural Monopoly



Profit Maximising Natural Monopoly

When AR > ATC, TR > TC as shown below.



Hence, profit maximizing natural monopolists will earn **economic profit** π , shown by the area (P^{*} – ATC) × Q^{*}.

Due to high barriers to entry, **a natural monopolist will continue to earn supernormal profits** *in the long run*.



Natural Monopoly with Government Intervention

However, at the profit maximising level of output, a welfare loss to society is incurred. Furthermore, natural monopolists often supply necessities e.g. utilities and public transit.

As a result, it is more socially efficient to operate at AR = P = MC, where allocative efficiency is achieved.



Natural Monopoly with Government Intervention

However, there is no incentive for a natural monopoly to operate at P = MC as ATC > AR and hence TC > TR.



Natural Monopoly – economic loss

Hence, allocatively efficient monopolists will incur an **economic loss** π , shown by (ATC – P*) × Q*.

As a result, a per-unit subsidy of ATC - AR is often granted to natural monopolists to cover the losses associated with producing at P = MC. In some cases, natural monopolists are nationalized.



Can you think of an example of a natural monopolist in your area that is subsidized or nationalized by the local government?





Test your knowledge on this unit: <u>Kahoot!</u>



Non-collusive Oligopoly

Oligopolies are markets which display the following characteristics:

- Two or more large firms
- Firms' decisions are mutually interdependent
- Significant barriers to entry





Characteristics of Non-collusive Oligopoly

Two or more large firms

• There are a few large firms that are in direct competition.

Firms' pricing decisions are interdependent

- Firms are mutually interdependent, meaning they consider each other's behaviours and decisions to develop **pricing** and **non-pricing** strategies.
- Firms may engage in price wars, where they attempt to steal demand from each other by lowering their prices.

Significant barriers to entry

• There are significant natural and artificial barriers to entry, preventing new entrants.



Concentration Ratios

Concentration ratios measure the sum of market share held by the largest firms in the industry.

For example, the four-firm concentration ratio (CR_4) measures the market share of the four largest firms combined ($C_1 + C_2 + C_3 + C_4$). This is used to demonstrate the collective market share of the largest firms in a market.

An oligopoly market will have high concentration ratio.







Real world example – global smartphone market

The global smartphone market is widely considered to be an oligopoly.

Calculate the four-firm and eight-firm concentration ratio with the data provided on the next slide.



Real world example – global smartphone market

Manufacturer	Market share (%)
Samsung	27.84
Apple	26.46
Xiaomi	10.63
Huawei	8.84
Орро	5.39
Vivo	4.12
Realme	2.41
Motorola	2.18
LG	1.58

Four-firm concentration ratio:

$$CR_4 = C_1 + C_2 + C_3 + C_4$$

= 27.84 + 26.46 + 10.63 + 8.84
= 73.77%

Eight-firm concentration ratio:

 $CR_8 = C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8$ = 73.77 + 5.39 + 4.12 + 2.41 + 2.18= 87.87%



Introduction to game theory – prisoner's dilemma

Watch from 0:00 to 1:00

- 1. What is the ideal outcome for the group?
- 2. What is the ideal outcome for each individual?
- 3. What is the likely outcome of the prisoner's dilemma?
- 4. How might the prisoner's dilemma apply to oligopolies?

Continue watching the rest of the video.



Game theory is a model that depicts mutual interdependence in oligopolistic markets.

A **payoff matrix** can show the profit outcomes of two firms with varying decisions e.g. pricing strategies.

	High price	Low price
orice High price	$\pi_A = $ \$50m	$\pi_A = $ \$70m
	$\pi_B = $ \$50m	$\pi_B = $ \$20m
	$\pi_A = $ \$20m	$\pi_A = $ \$30m
Low	π _B = \$70m	$\pi_B = $ \$30m

Cirm A

When both firms maintain a high price, both firms' profits are maximised and each firm will earn an economic profit of \$50 million.

In other words, the **globally optimal** strategy is when both firms adopt a high price as they will have a combined profit of \$100 million.

	_	High price	Low price
Firm B Firm B	price	$\pi_A = $ \$50m	$\pi_A = $ \$70m
	High	$\pi_B = $ \$50m	$\pi_B = $ \$20m
	orice	$\pi_A = $ \$20m	$\pi_A = $ \$30m
	Low p	$\pi_B = $ \$70m	$\pi_B = $ \$30m

Firm A



However, the globally optimal outcome is **unstable** as both firms have an incentive to lower their prices to gain economic profit.

If firm A engages in price competition and adopts a low-price strategy, their own profit will increase, despite the total profit shared between the two firms being lower.

	_	High price	Low price
Low price High price	price	$\pi_A = $ \$50m \square	$\Rightarrow \pi_A = $ \$70m
	$\pi_B = $ \$50m	$\pi_B = $ \$20m	
	$\pi_A = $ \$20m	$\pi_A = $ \$30m	
	Low	$\pi_B = $ \$70m	$\pi_B = $ \$30m

Firm Λ



Similarly, firm B will attempt to lower their prices to gain higher profits.



The behaviour of rational producers leads both firms to lower their prices in an attempt to maximise their profits. This ultimately damages their individual and collective profits.

	High price	Low price
Low price High price	$\pi = $ \$50m	π = \$70m
	$\pi = $ \$50m	π = \$20m
	$\pi =$ \$20m	π = \$30m
	$\pi = $ \$70m	$\pi = $ \$30m

Firm Λ
The Game Theory Payoff Matrix – stability

Here, we arrive at a stable outcome known as the **Nash equilibrium** where neither firm has any incentive to change their strategy as they will be worse off.

	FIIIIA			
	High price	Low price		
Low price High price	$\pi = $ \$50m	π = \$70m		
	$\pi = $ \$50m	π = \$20m		
	$\pi =$ \$20m	π = \$30m		
	π = \$70m	$\pi = $ \$30m		

Cirm A

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The Game Theory Payoff Matrix – stability

Firm A has no incentive to increase their prices as they would only decrease their profits.

Increasing prices will lead their profits to fall from \$30 million to \$20 million.

	FIRM A				
	High price	Low price			
price	$\pi = $ \$50m	π = \$70m			
HgiH	$\pi = $ \$50m	π = \$20m			
Low price	π = \$20m	π = \$30m			
	π = \$70m	$\pi = $ \$30m			



The Game Theory Payoff Matrix – stability

The same is true with firm B; increasing prices will lead their profits to fall from \$30 million to \$20 million.

Therefore, at the **Nash equilibrium**, both firms have no incentive to change their pricing strategy.

	FIRM A			
	High price	Low price		
price	$\pi = $ \$50m	π = \$70m		
46iH Firm B	$\pi = $ \$50m	π = \$20m		
Low price	$\pi =$ \$20m	π = \$30m		
	$\pi = $ \$70m	π = \$30m		





While the Nash equilibrium (the solution to the payoff matrix) is often the point where both firms make a lower profit, this is not always the case.

In this case, **the globally optimal outcome is also the Nash equilibrium**.

	High price	Low price
price	π = \$100m	$\pi = $ \$75m
High Low price	π = \$100m	π = \$15m
	π = \$15m	$\pi = $ \$20m
	π = \$75m	$\pi =$ \$20m

Firm A

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There is no incentive for firm A to decrease their prices as it would only lead their profits to fall from \$100 million to \$75 million.

	Firm A		
	High price	Low price	
Firm B High price	π = \$100m	$\pi = $ \$75m	
	π = \$100m	π = \$15m	
	π = \$15m	π = \$20m	
	π = \$75m	$\pi =$ \$20m	



Similarly, there is no incentive for firm B to decrease their prices as it would only lead their profits to fall from \$100 million to \$75 million.

	FILLEA			
	High price	Low price		
Low price High price	π = \$100m	π = \$75m		
	π = \$100m	π = \$15m		
	π = \$15m	π = \$20m		
	π = \$75m	π = \$20m		



Here, the globally optimal outcome is when both firms adopt a high pricing strategy as they will earn a maximum combined profit of \$200 million.

Furthermore, as there is no incentive for either firm to change their prices, the globally optimal outcome is also the Nash equilibrium in this payoff matrix.

	High price	Low price
price	π = \$100m	$\pi = $ \$75m
High Firm B	π = \$100m	π = \$15m
	π = \$15m	$\pi =$ \$20m
Low p	π = \$75m	$\pi =$ \$20m

Firm A

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Due to mutual interdependence, oligopolists often engage in **non-price competition** instead.

Examples of non-price competition include:

- Advertising
- Innovation
- Quality of products and/or services
- Corporate Social Responsibility
- After-sales service





Collusion

Collusion is an agreement between oligopolists to fix prices, collectively limit output, and to create artificial barriers to entry. The incentive to collude is engendered by the potential to earn supernormal profits.

An example of a collusive oligopoly is the Organization of Petroleum Exporting Countries (OPEC), where members collectively limit the world supply of oil to maintain high prices and supernormal profits.







Real world example – Phoebus cartel

The Phoebus cartel was an oligopoly that controlled the market of light bulbs. The organization appropriated market segments by location and deliberately lowered the lifespan of their products.



Real world example – Phoebus cartel

Watch the video from 0:00-1:38:

 How might the incentive to make longerlasting light bulbs relate to the payoff matrix?

Then, watch the video from 3:01-5:00:

2. What policy did the Phoebus cartel use to reduce the incentive for firms to cheat?



Collusive Oligopoly

When firms collude through price fixing and output restrictions, their collective market power combines to act as one dominant firm.

As a result, collusive oligopolists behave as a single monopolist, often earning economic profit π , shown by the area (P* – ATC) × Q*.







Test your knowledge on this unit: <u>Kahoot!</u>



Advantages of large firms having significant market power

While perfect competition is the most efficient market structure, there are benefits of large firms:

- Economies of scale
 - Internal
 - External
- Innovation
 - Process innovation
 - Research and development





Advantages of large firms having significant market power

Economies of scale

As production increases, the long run average costs of production fall as fixed costs are spread over a larger range of units. There are two types of economies of scale:

Internal economies of scale

- Specialisation
- Efficiency
- Marketing
- Purchasing

External economies of scale

- Lower recruitment costs
- Ancillary services



Advantages of large firms having significant market power

Innovation

Large firms with significant market power are able to earn supernormal profits, which can be invested into research and development (R&D).

Process innovation includes innovations in production that allow for the more efficient production of goods and services.

Product innovation drives new products which offer greater consumer choice.





Efficiency by market structure

The average revenue curve can be viewed as the demand curve faced by a firm, and the marginal cost curve being the firm's supply curve. Hence, **allocative efficiency** is reached when AR = P = MC, where MPB = MPC. As a rule of thumb, perfect competition is the only market structure that is allocatively efficient in the short run and long run, under profit maximization.

Market Structure	Short-run efficiency		Long-run efficiency	
(assuming profit maximization)	Allocative	Productive	Allocative	Productive
Perfect competition	\checkmark	When P = ATC	\checkmark	\checkmark
Monopolistic competition	X	Х	X	X
Oligopoly	Х	Х	Х	X
Monopoly	X	Х	X	X



Alternative objectives of firms

Despite the profit maximizing assumption, firms can also have the following objectives:

- Revenue maximization (MR = 0)
- Growth
- Social benefit
- Environmental benefit
- Satisficing (a perceived equitable combination of the above)

In other words, firms do not necessarily produce at the quantity where MC = MR.





Over to you...

Hoang, Wray, & Chakraborty (2020)

Economics for the IB Diploma Programme

- Page 211
- Paper 3 Exam Practice Question 14.9
- [2 + 2 + 2 marks]







Real World Example

Discuss the potential risks which might arise in markets dominated by one or a few very large firms.



A deficiency of competition in a market allows firms to control:

- Market supply (output)
- Market prices
- Consumer choice



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Market supply

- Under the profit maximising assumption, firms will always produce at MR = MC
- This is allocatively inefficient (P ≠ MC), leading to a underprovision and underconsumption of a product, ultimately creating a welfare loss.





Market prices

- Owing to the law of demand, restricted output will also lead to higher market prices, reducing consumer surplus.
- As large firms have enough power to manipulate market prices, a contestable monopolist may lower prices to increase barriers to entry as a form of anti-competitive behaviour.





Consumer choice

- Despite supernormal profits allowing firms to invest in R&D, a lack of competition lowers the incentive for large firms to innovate.
- Furthermore, with fewer large firms as opposed to more smaller firms, consumers have less options to choose from.



When monopolists abuse their power or when oligopolists collude, the government can intervene to protect the interests of consumers:

- Legislation and regulation
- Government ownership
- Fines





Legislation and regulation

- Antitrust regulation prevents firms from abusing their market power or engaging in anticompetitive behaviour.
- Governments can block mergers to prevent firms from gaining too much market power
- Incontestable firms may be forced to split up into a few smaller firms
- Tax breaks and support for entrepreneurs can promote competition
- Price controls can force firms' hands on pricing strategies.





Government ownership

- Governments can purchase private sector businesses and run them as public sector through a process known as nationalisation.
- As a result, governments can run large businesses such as natural monopolies in the best interests of the consumer.
- However, nationalization incurs significant monetary and opportunity costs, as well as being politically opposable.





Fines

- Breaches of antitrust laws can be deterred through the threat of fines.
- A monopolist exhibiting anti-competitive behaviour can be fined for its actions.
- An oligopoly found to be collusive can also be fined.
 Furthermore, whistle-blowers are often immune to litigation through leniency programmes, eroding trust between colluding oligopolists.
- However, this may increase the incentive to collude by lowering costs of exit.



