Oligopoly

Assessment Objectives

Specific Expectations	
AO2	Distinguish between collusive and non-collusive oligopoly and draw a diagram showing collusive oligopoly.
AO2	Explain the features of oligopoly including interdependence, risk of price war, and incentive to collude versus incentive to cheat.
AO2	Explain the relevance of price and non-price competition for firms of oligopoly.
AO2	Explain the presence of allocative inefficiency and market failure.
AO2	Explain the simple game theory payoff matrix.
AO2	Explain the meaning of market concentration and concentration ratios.
AO3	Discuss advantages and disadvantages of oligopoly.

Oligopoly

- **Oligopoly** is a market structure in which small numbers of producers compete with each other and face strategic interdependence.
  - There is a small number of large firms in the industry; because of their small number, the firms are interdependent, because the action of one firm affects others.
    - This means that each firm tries to predict what the rival firms will do.
    - Firms base their actions on the observed or anticipated actions of rival firms.
  - Products may be either differentiated or undifferentiated.
  - There are high barriers to entry; it is difficult for a new firm to enter the industry.
  - **Example(s):** Car industry, airlines, electronic equipment and the oil, steel, aluminum, copper and cement industries.

Oligopoly: Interdependence

- The interdependence of oligopolistic firms has important implications for their behaviour:

1. **Strategic behaviour**
   - Strategic behaviour is based on plans on actions that take into account rivals' possible courses of action.
   - Strategic behaviour of oligopolistic firms is the result of their interdependence.
   - Under oligopoly, firms planning their strategies make great efforts to guess the actions and reactions of their rivals in order to formulate their own strategy.
2. **Conflicting motives** – firms in oligopoly face incentives that conflict with each other.
   - **Incentive to collude** – the term collusion refers to an agreement between firms to limit competition between them, usually by fixing price and therefore lowering quantity produced.

Oligopoly: Interdependence

- By colluding to limit competition, they reduce uncertainties resulting from not knowing how rivals will behave, and maximize profits for the industry as a whole.
- **Incentive to compete** – At the same time, each firm faces an incentive to compete with its rivals in the hope that it will capture a portion of its rivals' market shares and profits, thereby increasing profits at the expense of other firms.
- If firms have formed a collusive agreement, they face an incentive to cheat on their "partners" in the agreement in order to increase their profits at their expense.

Oligopoly: Game Theory

- **Game Theory** is a mathematical technique analysing the behaviour of decision-makers who are dependent on each other, and who use strategic behaviour as they try to anticipate the behaviour of their rivals.
  - **Actions/Strategy** – The strictly-defined behaviours that a player has to choose between.
  - **Dominant Strategy** – A strategy that, regardless of what other players do, is the most beneficial strategy among all others.
  - **Payoff** – The specific increases or decreases of "value" within a value system that maps to a player's action.
  - **Payoff Matrix** – Shows all possible combinations of outcomes of different decisions made by the players in game theory.

Oligopoly: Game Theory

- **Nash Equilibrium** – The optimal outcome of a game where no player has an incentive to deviate from a chosen strategy.
  - There is no incremental benefit from changing actions, assuming other players remain constant in their strategies.
  - The Nash equilibrium shows that there is sometimes a conflict between the pursuit of individual self-interest and the collective firm interest.
  - Although firms could be better off cooperating, each firm, trying to make itself better off, ends up making both itself and rival worse off.
- The game illustrates many real-world aspects of oligopolistic firms including:
  - **Interdependence** – what happens to the profits of one firm depends on the strategies adopted by other firms; they therefore try to predict the actions of their rivals in order to plan out their own strategy.
  - **Strategic behaviour** – they plan their actions based on guesses about what their competitors are likely to do.

Oligopoly: Game Theory

- **Conflicting motives** – they face the incentive to collude (agree to fix prices where they both earn high profits); and they face the incentive to compete.
- They become worse off as a result of price competition (trying to capture sales from their rivals by cutting prices).
- Since rivals are likely to match the price cuts, all firms end up with lower prices and lower profits. This is called a **price war**.
- Firms have a strong interest in avoiding price wars, because they realize that everyone will become worse-off through price cutting – this creates a strong incentive for them to compete on the basis of factors other than price (non-price competition).

Example 1: Prisoner's Dilemma

		Prisoner B	
		Confess	Quiet
Prisoner A	Confess	5 Years 5 Years	10 Years 0 Years
	Quiet	0 Years 10 Years	1 Year 1 Year

Example 2: Red or Green

Player 2

Player 1	Red	Green
Red	$2.20, $2.20	$0.20, $3.00
Green	$3.00, $0.20	$1.00, $1.00

Example 3: Split or Steel

		Player 2	
		Split	Steal
Player 1	Split	50% / 50%	0% / 100%
	Steal	100% / 0%	0% / 0%

Game Theory and Oligopoly Behaviour

Starbucks vs. Tim Hortons

The "players" are the firms: Two cofee shops, Starbucks and Tim Hortons

The "moves" are the actions the firms can take: The coffee shops can either advertise around town or not advertise.

The "payoffs" are the profits the firms will earn: Avertising increases firms' costs, but can also increase revenues.

Tim Hortons \ Starbucks	Don't Advertise	Advertise
Don't Advertise	$15 (upper right) / $15 (lower left)	$20 (upper right) / $10 (lower left)
Advertise	$10 (upper right) / $20 (lower left)	$12 (upper right) / $12 (lower left)

The equilibrium outcome of the game is that both firms will advertise. even though both would be better off by not advertising, such an outcome is instable since each firm would have an incentive to advertise if its competitor did not.

Example 5: Rock, Paper, Scissors

Alice \ Bob	Paper	Rock	Scissor
Scissor	(1,-1)	(-1,1)	(0,0)
Rock	(-1,1)	(0,0)	(1,-1)
Paper	(0,0)	(1,-1)	(-1,1)

Oligopoly: Price and non-price competition

- Oligopolistic firms go to great lengths to avoid price competition which results in price rigidities.
- They are careful not to trigger a **price war** which is competitive price-cutting by firms as each one tries to capture market shares from rival firms; resulting in lower profits for firms.
- Oligopolistic firms do engage in intense non-price competition, involving efforts by firms to increase market share by methods other than price, which typically include the following:
  - **Product development** – provides firms with a competitive edge; they increase their market power, demand for the firm's products become less elastic, and successful products give rise to opportunities for substantially increased sales and profits
  - **Branding and advertising** – oligopolistic firms often have considerable financial resources (due to large profits) that they can devote to both R&D and advertising and branding.

Oligopoly: Price and non-price competition

- **Product differentiation** – can increase a firm's profit position without creating risks for immediate retaliation by rivals. It takes time and resources for rival firms to develop new competitive products.
- Numerous services such as quality customer service, warranties, provision of credit, discounts on upgrades and others.

Collusive and Non-collusive oligopoly

- **Collusive oligopoly** refers to the type of oligopoly where firms agree to restrict output or fix the price, in order to limit competition, increase market power (monopoly power) and increase profits.
  - **Collusion** is an agreement among firms to fix prices, or divide the market between them, so as to limit competition and maximize profits.
    - **Cartel** – is a formal agreement between firms in an industry to take actions to limit competition in order to increase profits.
    - The key objective of a cartel is to limit competition between member firms and maximize joint profits.
    - Cartel members collectively behave like a monopoly.
    - **Informal (Tacit) collusion** – refers to co-operation that is implicit or understood between cooperating firms, without a formal agreement.
    - The objective of informal collusion is to coordinate prices, avoid competitive price-cutting, limit competition, reduce uncertainties and increase profits.

Collusive and Non-collusive oligopoly

- **Price leadership** – occurs where a dominant firm in the industry (which may be the largest one, or the one with the lowest costs) sets a price and also initiates any price changes.

- Firms participating in a cartel have much to gain:
  - Increased market power and hence the ability to control price of a product
  - Increased profits due to higher prices
  - Elimination of competition between firms, and therefore no more uncertainty or need to outguess their rivals.
- Collusion is not easy to create and maintain for several reasons.
  - **Incentive to cheat** – every firm faces an incentive to cheat on the agreement, by offering to secretly lower the price for some buyers.
  - **Cost difference among firms** – since the price agreed upon is common to all firms, firms with higher average costs have lower profits, while lower-cost firms enjoy higher profits. Cost difference between firms leads to difficulties agreeing on a common price.

Collusive and Non-collusive oligopoly

- **Number of firms** – the larger the number of firms, the more difficult it is to arrive at an agreement regarding price and the allocation of output, as the greater number of differing views make agreement and compromise more difficult to achieve.
- **Possibility of a price war** – a possible outcome of one or more firms cheating is a price war, where one firm's price cut is matched by retaliatory price cuts by other firms. The result of a price war is to make all firms of an industry collectively worse-off due to lower prices and lower profits.

- **Non-collusive oligopoly** a type of oligopoly where firms do not make agreements among themselves in order to fix prices or collaborate in some way.
  - Each firm behaves independently; however, they are still aware of each other in their pricing decisions and display strategic behaviour in that they take the possible actions of their rivals into consideration.

Collusive and Non-collusive oligopoly

- Prices of oligopolistic industries tend to be rigid or inflexible; one a particular price is reached, it tends to be relatively stable over long periods of time
- Moreover, in situations when prices do change, they tend to change together for all firms in an industry.
- **Firms that do not collude are forced to take into account the actions of their rivals in making pricing decisions.** Otherwise they risk lowering their revenues and profits, which in turn could lead to price instability.
- **Even though firms do not collude, there is still price stability.** Firms are resultant to change their price because the likely actions of their rivals, which could result in lower profits for the firm initiating price changes.
- **Firms do not compete with each other on the basis of price.** They do not try to increase their sales by attracting customers through lower prices. A lower price not only invites price cuts by rivals, with resulting lower profits for all the firms, but also risks setting off a price war.

Concentration Ratio

- **Concentration ratio** a measure of how much an industry's production is concentrated among the industry's largest firms.
  - It measures the percentage of output produced by the largest firms in an industry, and is used to provide an indication of the degree of competition or degree of market power in an industry.
  - The higher the ratio, the greater degree of market power.
  - **Market concentration** is the degree to which a market is dominated by a small number of large firms. The smaller the number of firms controlling a market, the greater the market concentration.
  - **Herfindahl-Hirschman** index is the sum of the squared market shares of the top N largest firms in the industry.

$$\mathrm{HHI} = \mathrm{M}_1^2 + \mathrm{M}_2^2 + \ldots \mathrm{M}_\mathrm{N}^2$$

    - $\mathrm{HHI} < 0.1$ indicates a competitive market.
    - $0.18 > \mathrm{HHI} > 0.1$ indicates moderate competitive.
    - $\mathrm{HHI} > 0.18$ indicates uncompetitive.

Concentration Ratio

- Concentration ratios have several weaknesses that limit their usefulness as a measure of the degree of competition:
  - Whereas concentration rations reflect concentration in a national market, they do not reflect competition from abroad, arising from imports.
  - Concentration ratios provide no indication of the importance of firms in the global market; there may be some competition in the domestic market, but the firms may have a very strong, or dominant position in the global market.
  - Concentration ratios do not account for competition from other industries, which may be important in the case of substitute goods.
  - Concentration ratios do not distinguish between different possible sizes of the largest firms

Criticisms of Oligopoly

- To the extent that oligopolistic firms succeed in avoiding price competition, they achieve a considerable degree of market power, and therefore similar criticisms as a monopoly:

  Welfare loss, allocative inefficiency and market failure.

  - Higher prices, lower quantities of output than under competitive conditions.
  - Loss of consumer surplus to the oligopolists due to higher prices $P > MC$.
  - Negative impacts on the distribution of income.
  - There may be higher production costs due to lack of price competition.
  - Possibly less innovation.
  - Many countries have anti-monopoly legislation that protects against the abuse of market power.
  - The difficulties of detecting and proving collusion among oligopolistic firms means that such firms may actually behave like monopolies by colluding and yet may get away with it.

Benefits of Oligopoly

- The benefits of oligopoly include:
  - Economies of scale can be achieved due to the large size of oligopolistic firms, leading to lower production costs to the benefit of society and the consumer (through lower prices).
  - Product development and technological innovations can be pursued due to high abnormal profits from which research funds can be drawn.
  - Product development leads to increased product variety, thus providing consumers with greater choice.
  - Technological innovations that improve efficiency and lower costs of production may be passed to consumers in the forms of lower prices.