INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Class: SY BSc

Subject : Business Economics - Micro

Chapter: Unit 4 Chapter 2

Chapter Name: Theory of Firm – 2

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    2. Monopolistic competition - Example
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Today's Agenda

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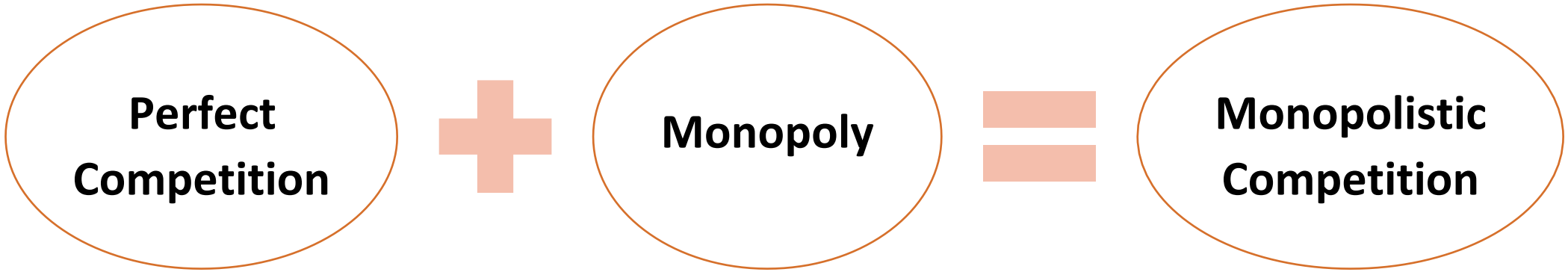
1.1 Monopolistic competition - Meaning



1.1 Monopolistic competition - Meaning

- It can be found in real world market
- There are many buyers & Sellers of product
- Product differentiation

1.2 Monopolistic competition - Example

Monopolistic competition is the most common form of market and is seen everywhere.
Give examples of industries and products following this form of market.

1.2 Monopolistic competition - Example

- Automobile Industry
  There are many seller in this such as
  - Maruti Suzuki
  - Honda
  - Hyundai
  - Ferrari
  - Toyota
  - Mahindra

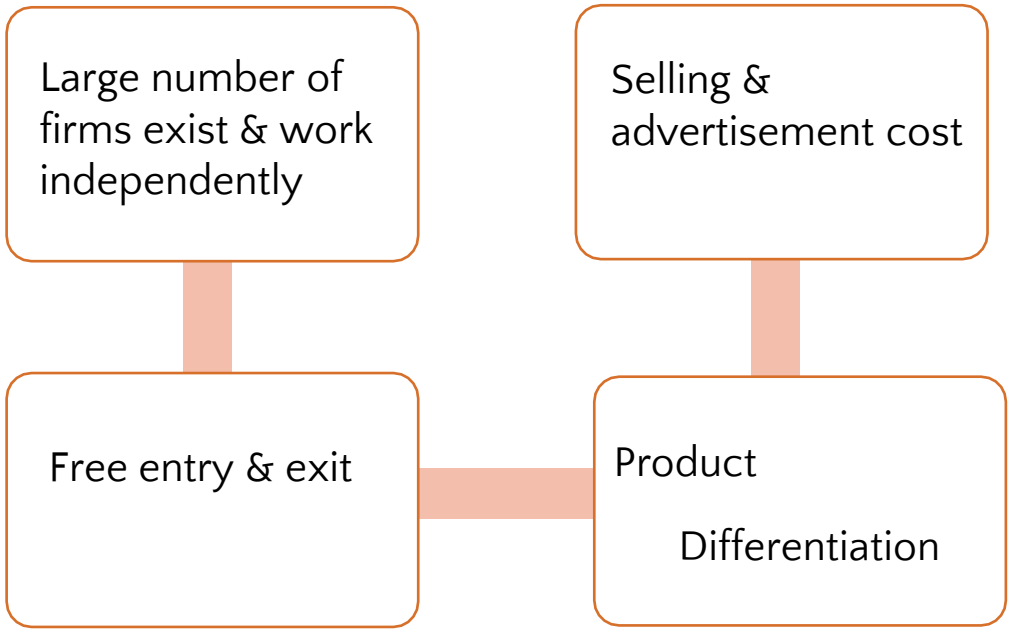
Every Seller has their different product to offer different features

- Formula 1 sport
  Maximum 10 teams
  2 cars per team
  Minimum Budget – $200m

1.2 Monopolistic competition - Example

Which form of market will the emerging sector of Electronic vehicles (EVs) in India form?

1.3 Features

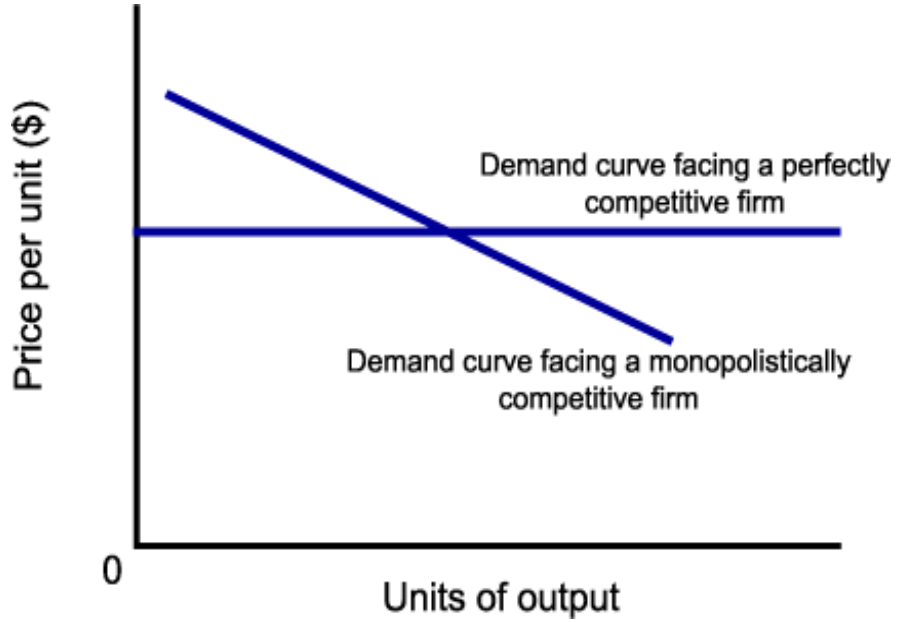

Large number of firms exist & work independently
Selling & advertisement cost
Free entry & exit
Product Differentiation

1.3 Features

Which type of elasticity of demand will the demand curve of a monopolistic competition be?
Will it be more or less elastic as compared to perfect competition and monopoly?

1.4 Product Differentiation

- Monopolistic competition differs from perfect competition in the sense that each firm produces a product or provides a service in some way different from those of its rivals.
- As a result, it can raise its price without losing all its customers. Product Differentiation reduces the Elasticity of Demand
- Based on the availability of substitutes, the demand curve faced by a monopolistic competitor is likely to be *less elastic* than the demand curve faced by a perfectly competitive firm, and likely to be *more elastic* than the demand curve faced by a monopoly.



1.4 Product Differentiation

Highlight your real life correlation to any product differentiation of any 2 products in the same industry

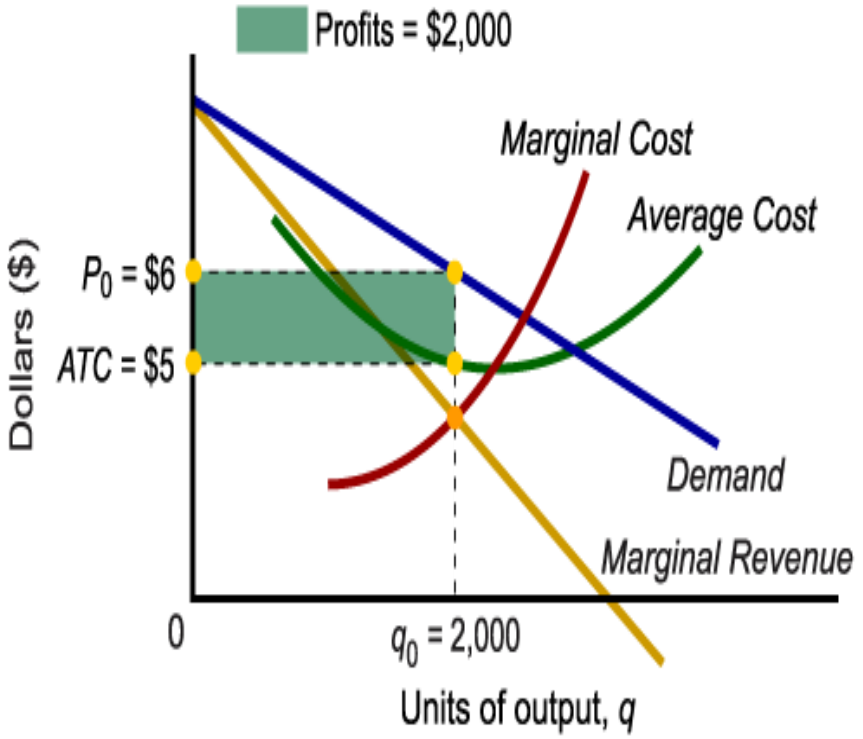
2.1 Equilibrium of Firm – Short run

- As with other markets profits are maximised at output where MC = MR
- AR & MR is more elastic because there are many seller are available in market that's why demand is more elastic

2.1 Equilibrium of Firm – Short run

Profit situation shown in graph

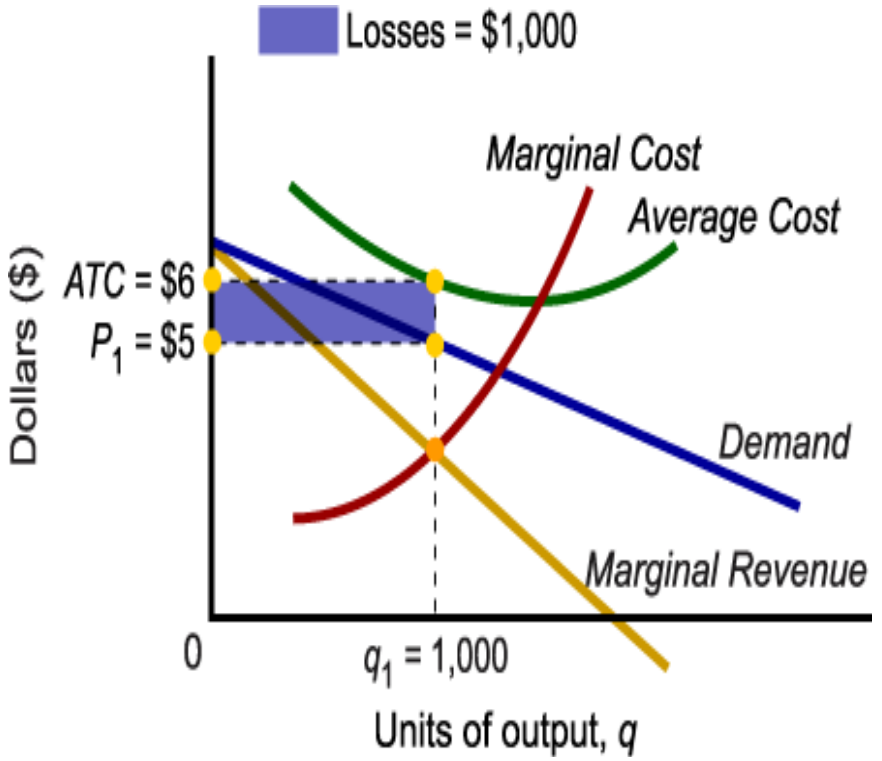
- Just how much profit the firm will make in the short run depends on the strength of demand: the position and elasticity of the demand curve.
- The further to the right the demand curve is relative to the average cost curve, and the less elastic the demand curve is, the greater will be the firm's short-run profit.
- Thus a firm facing little competition and whose product is considerably differentiated from that of its rivals may be able to earn considerable short-run profits.



2.1 Equilibrium of Firm – Short run

Loss situation shown in graph

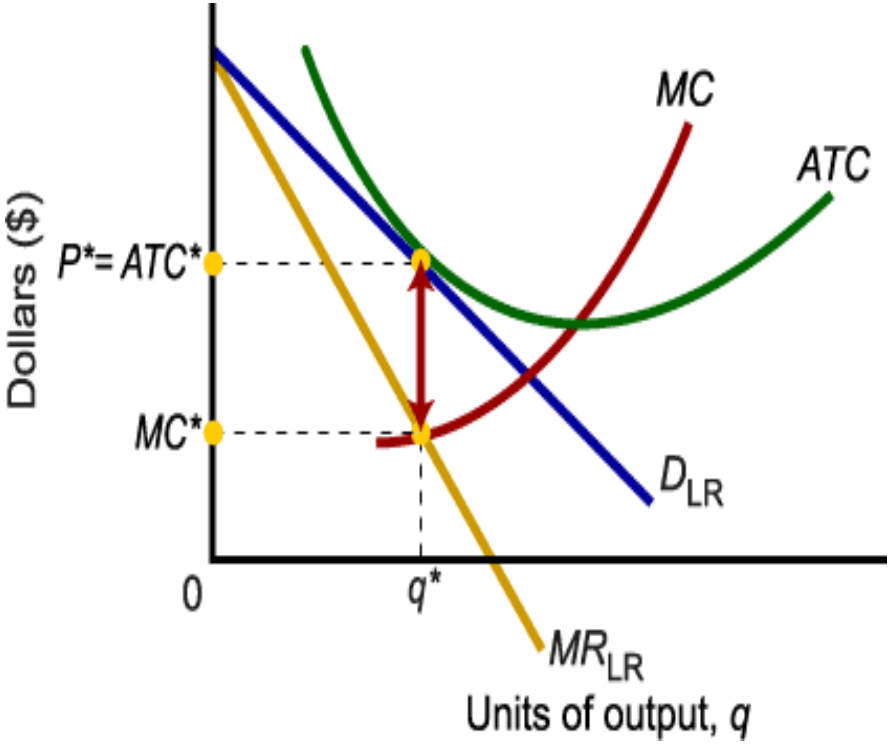
- If the demand for a product is not favourable of firm then there is situation of loss
- Profits are not guaranteed. Here, a firm with a similar cost structure is shown facing a weaker demand and suffering short-run losses



2.2 Equilibrium of Firm – Long run

Long run situation shown

- More firms will continue to enter the industry until the firms are earning only a normal profit.
- However, if there are too many firms, then firms will incur losses, especially the inefficient ones, which will cause them to leave the industry. Consequently the remaining firms will return to normal profitability. ,
- Hence, the long-run equilibrium for monopolistic competition will equate the market price to the average total cost, where marginal revenue = marginal cost, as shown in the diagram below.
- Remember, in economics, average total cost includes a normal profit.

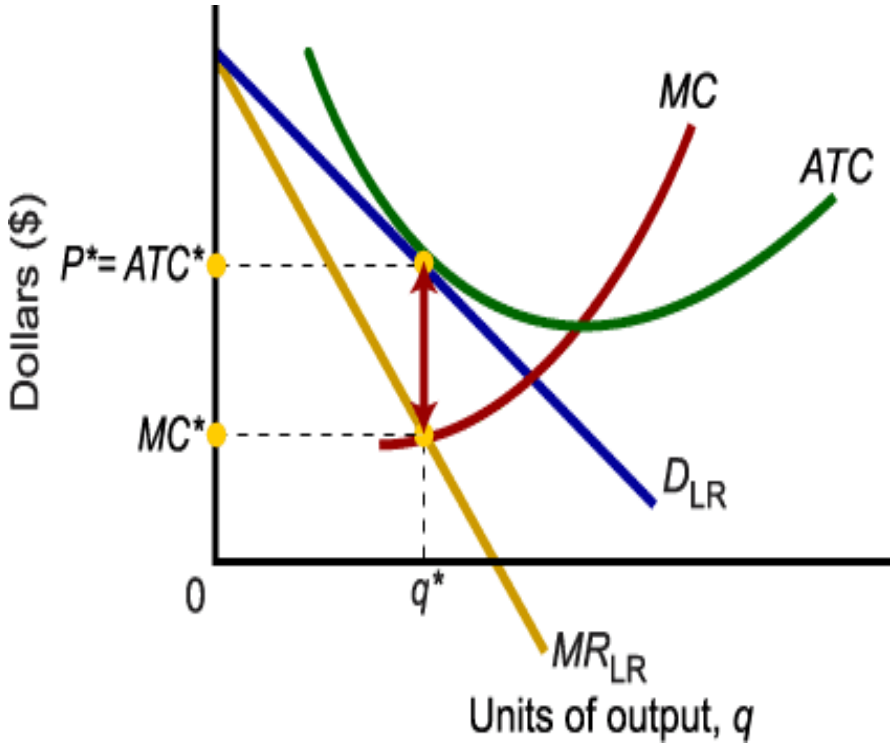


2.3 Economic Efficiency & Resource Allocation

In the long-run, economic profits are eliminated; thus, we might conclude that monopolistic competition is efficient, however:

- Price is above marginal cost. More output could be produced at a resource cost below the value that consumers place on the product.

- Average total cost is not minimized. The typical firm will not realize all the economies of scale available. Smaller and smaller market share results in excess capacity.

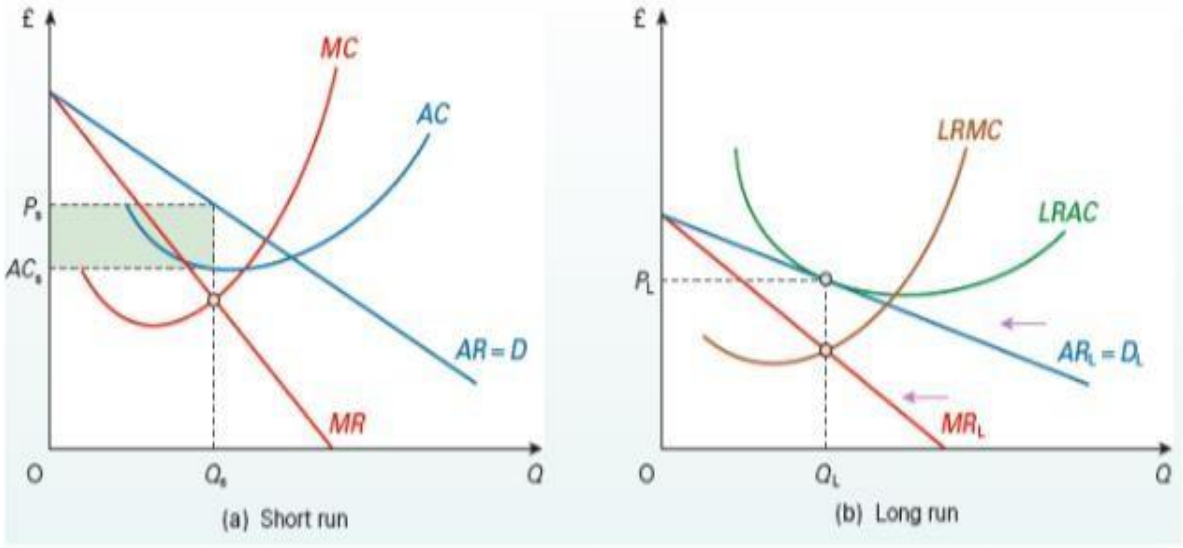


3 Limitations

Monopolistic competition is the most common form of market and is seen everywhere.
Discuss its limitations.

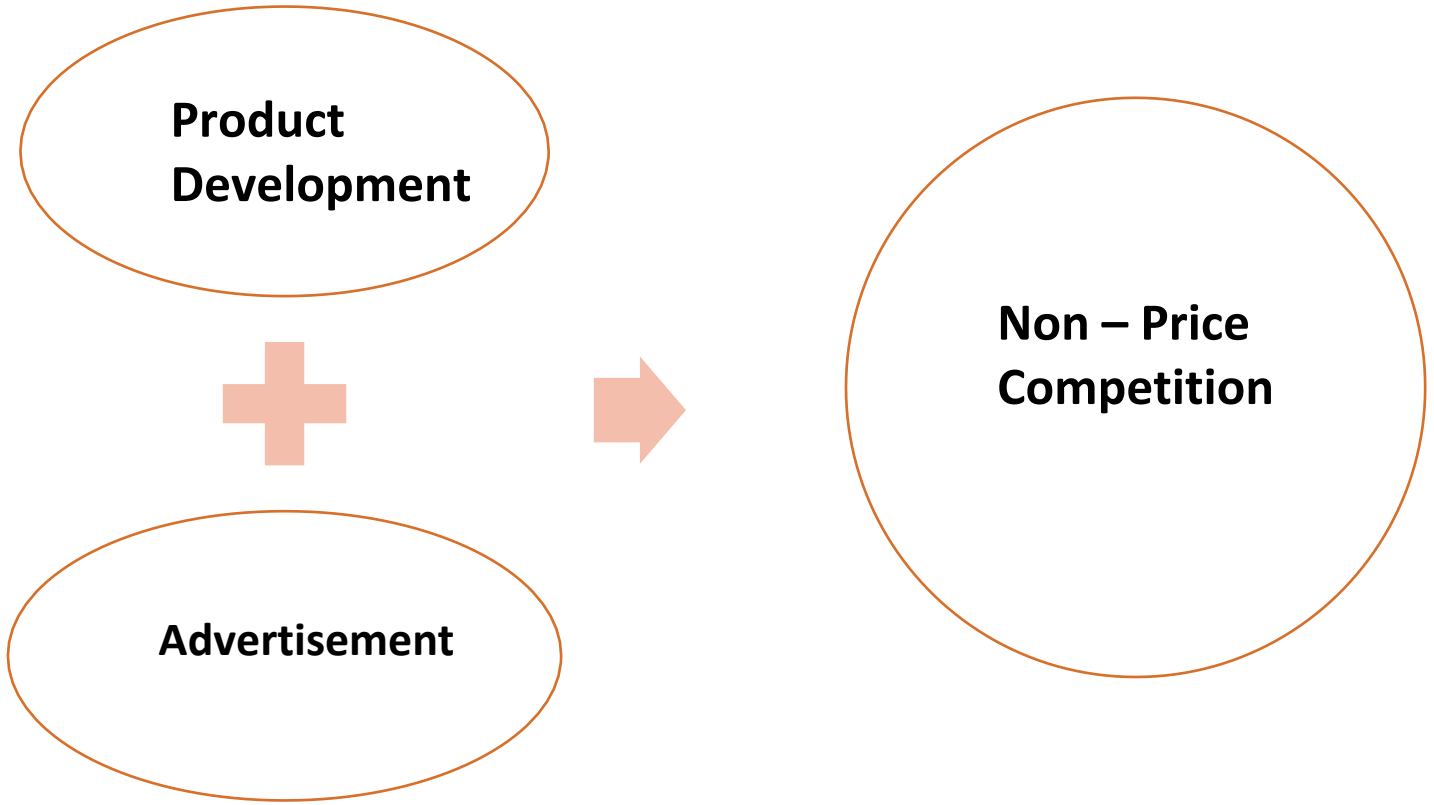
3 Limitations

- Information may be imperfect
- Firms will not enter if they are not aware supernormal profit are being made
- Difficult to derive demand curve for industry as whole because firm in the industry produces different products
- Firms are likely to differ on cost & size structure
- This model focus on price & output decision but profit maximizing firm also has to decide verity of product to produce & expenditure on advertising



4 Non-Price Competition

This involves 2 major elements : Product development & Advertisement



4 Non-Price Competition

- Product development

'Product development' takes the form of attempting to provide a service which is better than, or at least different from, that of rivals.
Aim – Produce the product that sell well

- Advertisement

Aim – To sell the product.
This can be achieved not only by informing the consumer of the product's existence and availability, but also by deliberately trying to persuade consumers to purchase the good.

4 Non-Price Competition

Two problems arise with this analysis:

- The effect of product development and advertising on demand will be difficult for a firm to forecast.

- Product development and advertising are likely to have different effects at different prices. Profit maximisation, therefore, will involve the more complex choice of the optimum combination of price, type of product, and level and variety of advertising.

4 Non-Price Competition

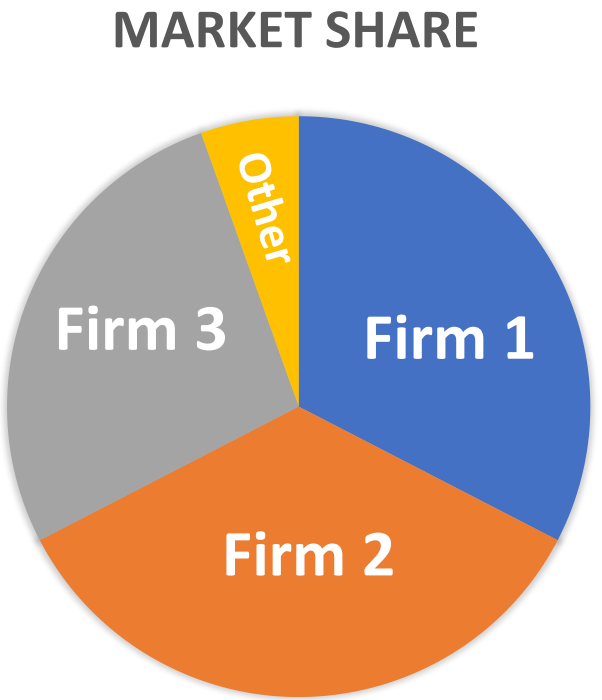
Give examples where 2 products of the same industry used advertisement based on different features/service of their product to compete.

4 Comparison

Particulars	Perfect Competition	Monopoly	Monopolistic Competition
Number of producer	Many	Single	Many
Types of goods & service	Homogeneous	Unique	Differentiated
Does the firm have control over their own price?	No – Firm is price taker	Yes - Full control	Yes – Some pricing power
Is branding/marketing important?	No	No	Yes
Are entry barriers low, high or none?	Zero	High	Low
Equilibrium point	MC = MR	MC = MR	MC = MR
Demand curve	Perfectly elastic	Less elastic	More elastic

5.1 Oligopoly competition - Meaning

- Oligopoly is derived from Greek word where
  "Oligo" means few
  "Poly" means to sellers
- Market dominated by few large sellers
  i.e competition amongst few
- For example, Let's say a market has 50 competitors. However, the top three dominate 90% of the market. That market is an oligopoly.



5.1 Oligopoly competition - Meaning

Which of the following is an oligopoly market?

1. Soap industry in India dominated by dove, lux, pears, santoor with other 7072 different types of soaps
2. Telecom industry in India dominated by Jio, Airtel, VI, BSNL and other 11 types of operators

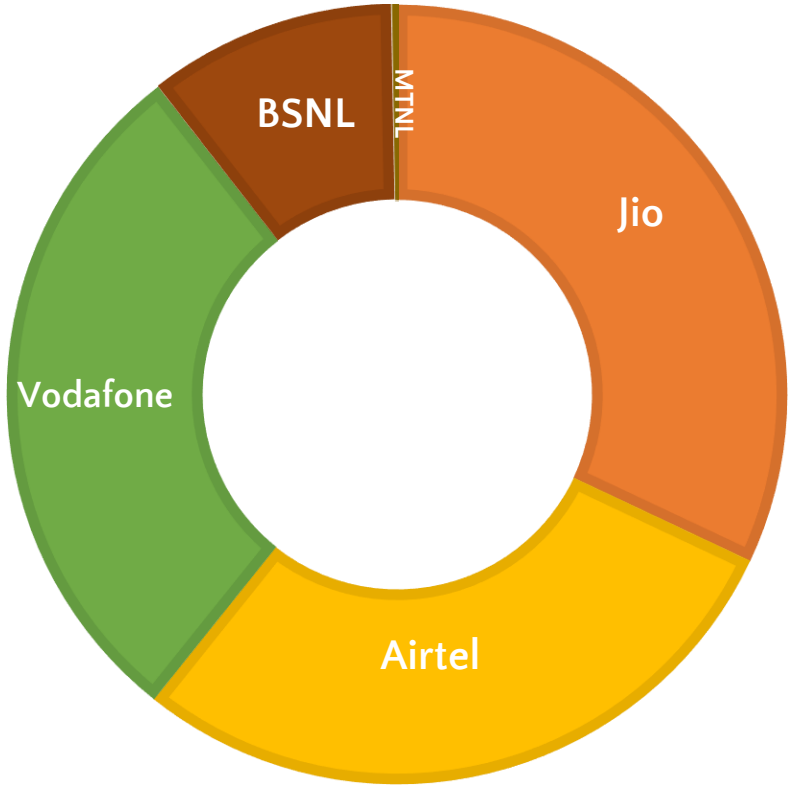
Both

5.2 Oligopoly competition - Example

Real life example

Mobile network operator by market share

Operator	Market share
Jio	32.14%
Airtel	28.83%
Vodafone	28.89%
BSNL	10.26%
MTNL	0.29%



5.2 Oligopoly competition - Example

Oligopoly competition is a common form of market and is seen various industries.
Give examples of industries and companies dominating in this form of market.

5.3 Classification

Oligopoly market can classified on following bases.

- Nature of product:

    1. Pure oligopoly is one in case of which the product produced by the competing firms in the market is identical or homogeneous.

    1. Differentiated oligopoly is supposed to exist in the market, when the firms in the market produce and sell the nonhomogeneous.

- Entry of firms:

    1. Open oligopoly: when the new firms are allowed to enter in to the market. It is called open oligopoly.

    1. Closed oligopoly: when the new firms are not allowed to enter in to the market. It is called closed oligopoly.

5.3 Classification

- Price leadership:

    1. Partial oligopoly: when a large firm in the market is recognized as price leader, the other smaller firms in the market follow the price fixed by the leader firm.

    1. Full Oligopoly: Where there is no leading firm to determine the price of a product in the market. The firm may be engaged in price competition in the case of full oligopoly.

- Agreement or Collusion:

    1. Collusive Oligopoly: When different firms in the oligopoly market have some informal or formal agreement about price, output, division of market, profit sharing etc.

    1. Non Collusive Oligopoly: When there is no agreement or collusion among the firms.

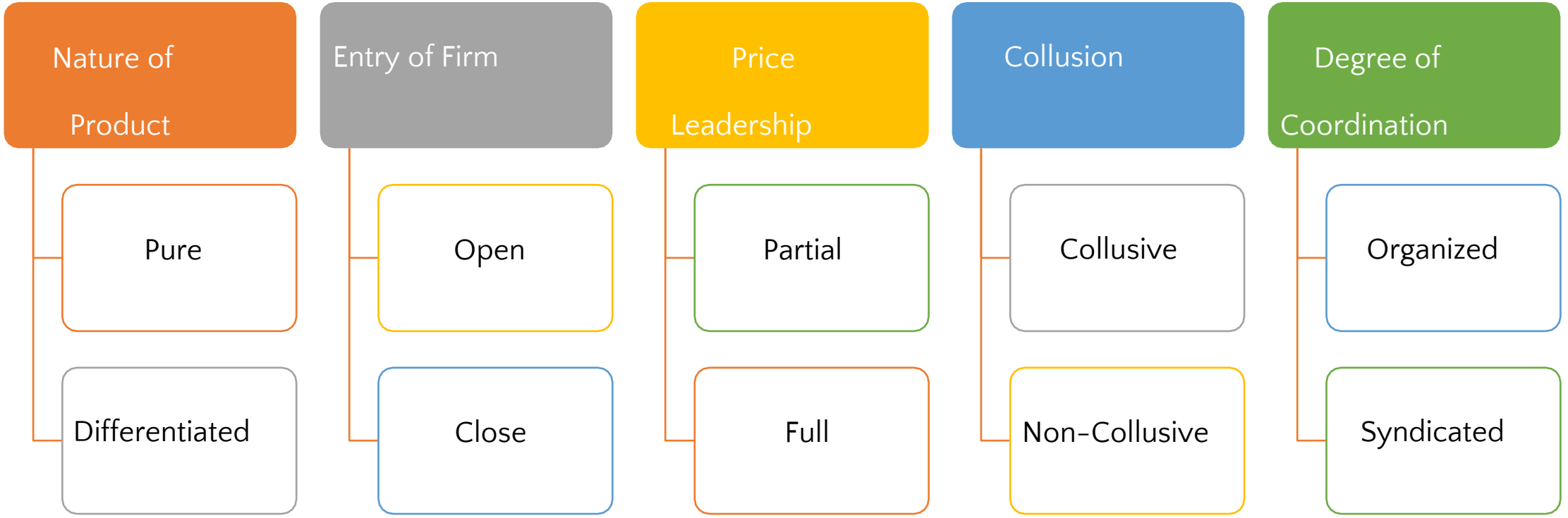
5.3 Classification

- Degree of Co-ordination:

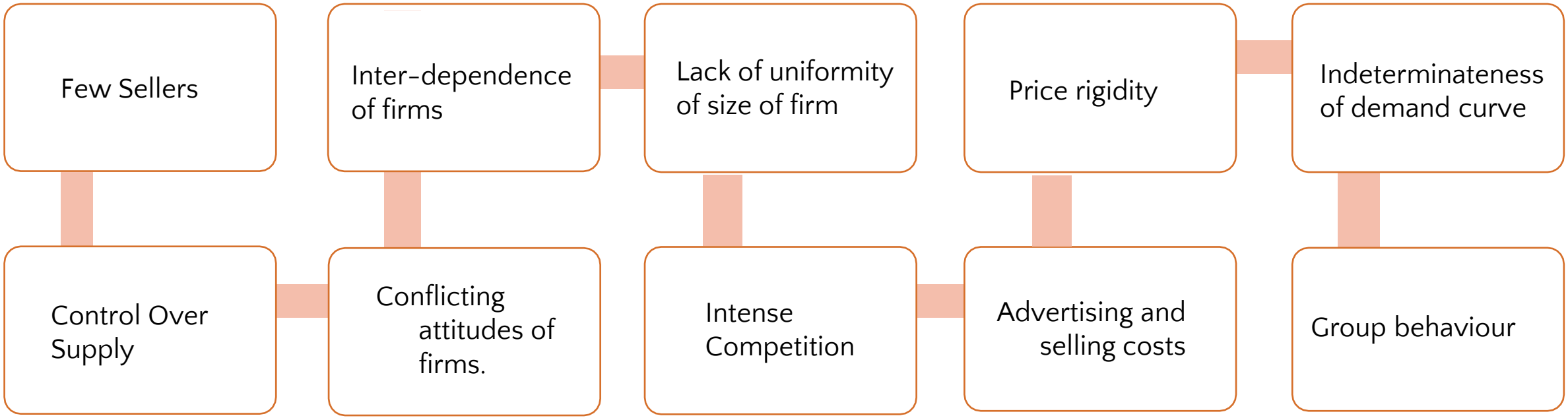
    1. Organized oligopoly: When the different firms in the market avoid price competition by organizing themselves into a central association for fixing price, output quotas etc.

    1. Syndicated oligopoly: All the firms in the market crate a syndicate or cartel which is a common selling organization for the sale of output turned out by all firms.

5.3 Classification



5.4 Features


Few Sellers
Inter-dependence of firms
Lack of uniformity of size of firm
Price rigidity
Indeterminateness of demand curve
Control Over Supply
Conflicting attitudes of firms.
Intense Competition
Advertising and selling costs
Group behaviour

5.5 Difference between Collusive and Non-collusive

Collusive

1. Firms might decide to collude together and not compete with each other.
1. Firms behave as single monopoly.
1. They aim at maximizing their collective profit instead of individual profit
1. Eg: Cartel formation and Price leadership.

Non – Collusive

1. Firms compete with each other.
2. Firms behave independently.
3. Aims at maximizing their own profit.
4. Eg: Price Rigidity (Kinked demand curve.)

6 Collusive Oligopoly

The interdependence of firms in an oligopolistic market pulls them in two very different directions:

- Each firm, by carefully studying the market and its rivals' strategy may believe that, by competing, it can gain a greater share of industry profits.

- On the other hand, firms may conclude that competition will be destructive and lead to lower profits: i.e. through retaliatory price-cutting. So instead, they may prefer to collude with each other by making agreements about price, output, product design, etc. By acting together as if they were a monopoly, the firms could take actions that jointly maximize industry profits and share these profits between them. When firm cooperate with each other in determining price & output or both called collusive oligopoly

6 Collusive Oligopoly

- A formal collusive agreement is called a cartel.
- A 'cartel' is an organization of independent firms, producing similar products, which work together to raise prices and restrict output.

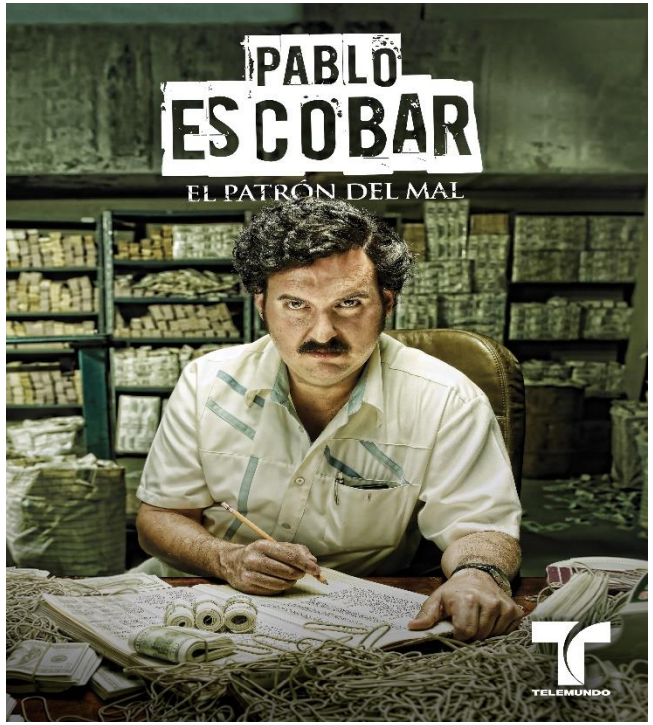
Example – OPEC (Organization for petroleum exporting countries)

Cartels formed in past

1. Beer cartels – Netherlands – 2007
2. Cement cartel – Argentina – 1981-1999
3. Drug cartel in Mexico and Colombia.
4. Four airline companies – South Africa – 2004

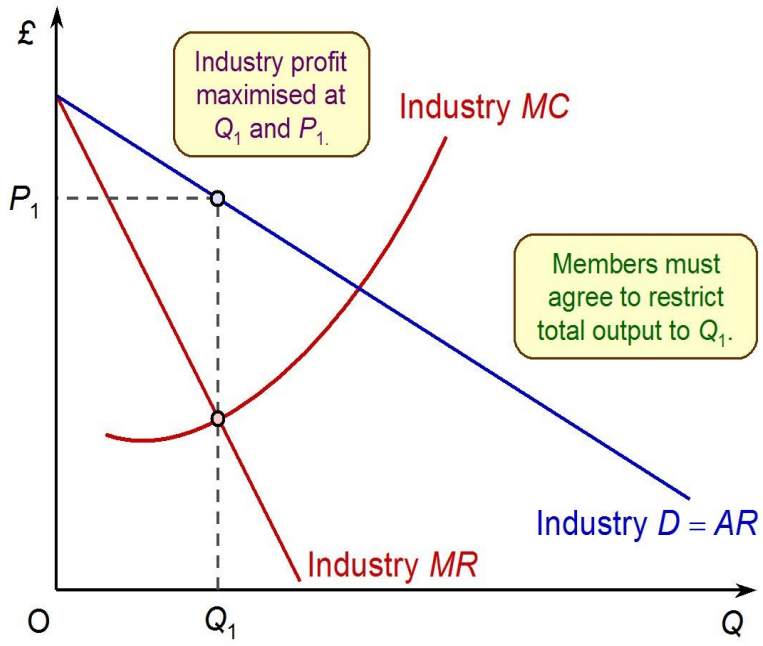
In most of the above cases, the cartels were fined heavily to bring to an end the collusion for earning excess profit through higher prices.

'Oligopoly: Cartel and Collusion (Explicitly Explained)' - Video



6.1 Industry Equilibrium under Collusive Oligopoly

- When firms under oligopoly engage in collusion, they may agree on output, prices, market share, advertising expenditure, etc.
- It reduces the fear of engaging in competitive price cutting or retaliatory advertising, both of which could reduce total industry profits.
- The cartel will maximize profits if it acts like a monopoly: if the members behave as if they were a single firm. This is illustrated in the following graph.
- The total market demand curve is shown with the corresponding market MR curve. The cartel's MC curve is the horizontal sum of the MC curves of its members.
- Profits are maximized at Q1 where MC =MR. The cartel must therefore set a price of P1 (at which Q1 will be demanded).



Profit-maximising cartel

6.2 Tacit Collusion : Price Leadership

- This is when one firm has a **dominant position in the market** and the firms with lower market shares follow the pricing changes prompted by the dominant firm.

- We see examples of this with the major mortgage lenders and petrol retailers where most suppliers follow the pricing strategies of leading firms.

- If most of the leading firms in a market are moving prices in the same direction, it can take some time for relative price differences to emerge which might cause consumers to switch their demand.

- Firms who market to consumers that they are “never knowingly undersold” or who claim to be monitoring and matching the cheapest price in a given geographical area are essentially engaged in **tacit collusion**. Does the consumer really benefit from this? Probably not!

6.2 Tacit Collusion : Price Leadership

Outcome of the price-leadership model:

1. The quantity demanded in the industry is split between the dominant firm and the group of smaller firms.

1. This division of output is determined by the amount of market power that the dominant firm has.

1. The dominant firm has an incentive to push smaller firms out of the industry in order to establish a monopoly.

6.3 Dominant Price Leadership

- There is a large dominant firm which has a considerable share of total market, and some small firms, each of them having a small market share. The market demand is assumed known to dominant firm
- It is also assumed that the dominant firm knows the MC curves of the small firms.
- At each price dominant firm will be able to supply the section of total market not supplied by small firm.
- The dominant firm maximizes his profit by equating MC and MR, while the small firms are price takers, and may or may not maximize their profit, depending on their cost structure.

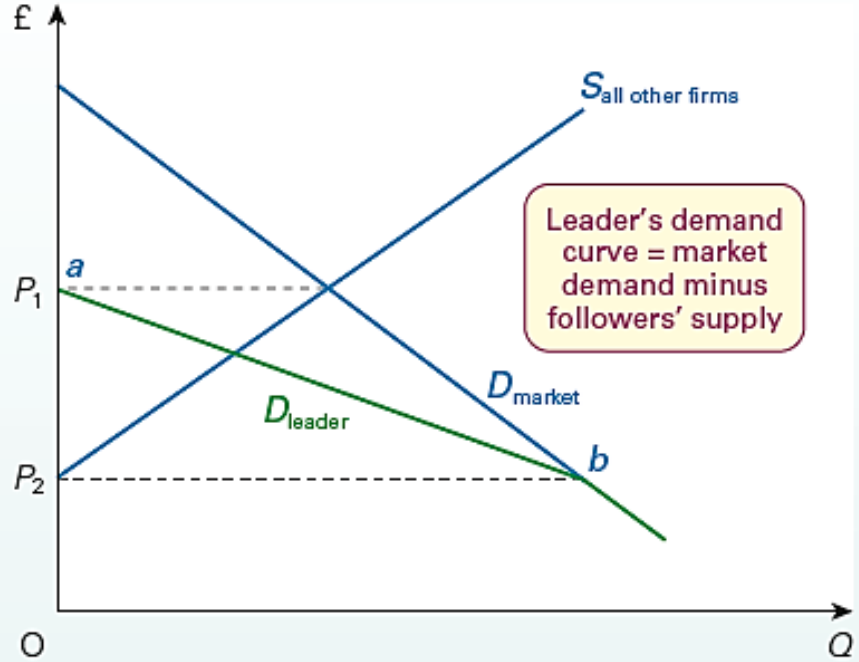
6.3 Dominant Price Leadership

The setting of prices in a market by a dominant company, which is followed by others in the same market.

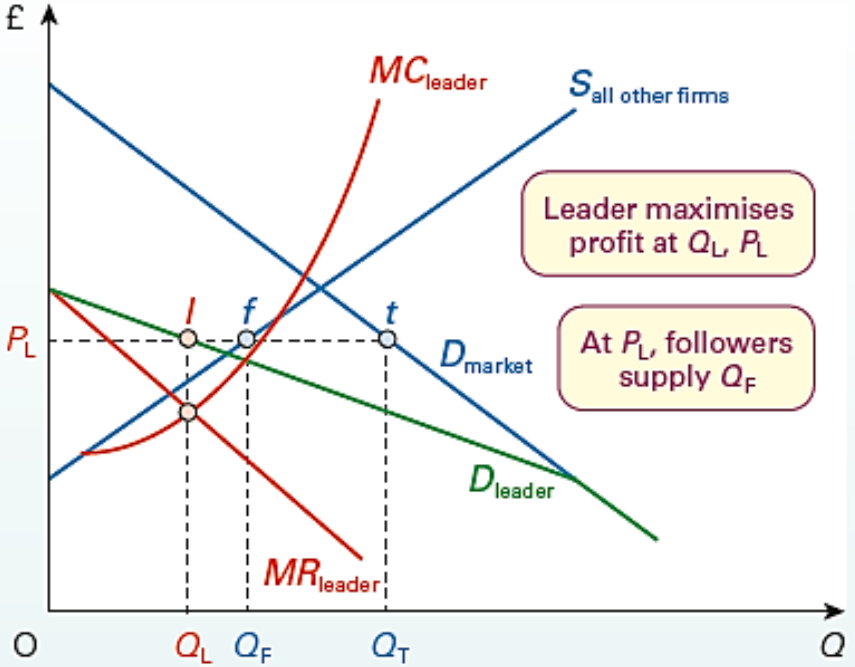
- The leader firm will set the price based on this equilibrium (SMCs = MRd) at point E.
- The price is Rs.6 at which the leader and the followers will sell their output.
- The followers will produce upto the point where ΣSMCs = Price i.e point L.
- The total output will be 6, of which 4 will be sold by the followers and 2 by the leader charging Rs.6, the price set by the leader.

'Oligopoly Price Leadership Dominant Firm' – Video

6.3 Dominant Price Leadership



(a) Division of the market between leader and followers



(b) Determination of price and output

6.3 Dominant Price Leadership

Why would firms practice dominant price leadership?

6.3 Dominant Price Leadership

Give examples of a dominant price leader in an Indian industry

6.4 Barometric Firm Price Leadership

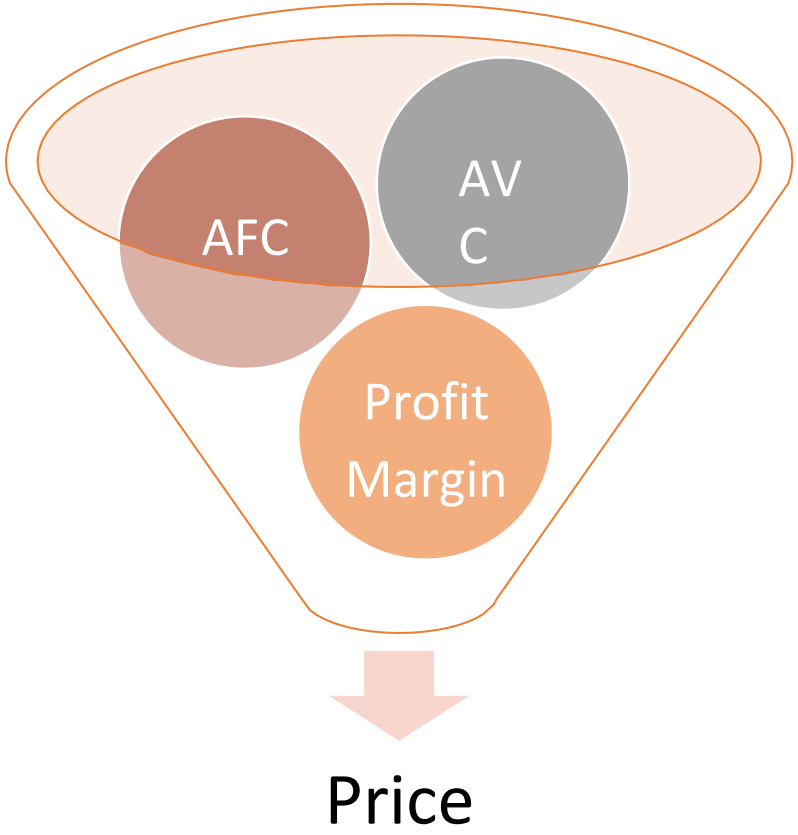
- Barometric Firm is a firm supposed to have a better knowledge of the prevailing market conditions and has an ability to predict the market conditions more precisely than any of its competitors.
- Usually it is the firm which from past behavior has established the reputation of good forecaster of economic changes.
- Other industries follow as they try to avoid the continuous recalculation of costs, as economic condition changes.

6.5 Tacit Collusion : Rule of Thumb

- Tacit collusion may also occur where firms in the industry follow a set of **'rules of thumb'** instead of a price leader. Such rules may be designed to prevent destructive competition and thus maintain longer term profitability, although some short run profitability may be sacrificed as the rules do not require MC and MR to be equated. One such rule of thumb is **cost-plus pricing.**

- **Cost-plus pricing** – This is also known as average cost pricing, mark-up pricing and full-cost pricing, and empirical evidence suggests that it is the most common pricing procedure adopted by firms. It involves firms setting price by adding a standard percentage profit margin to average costs, so that: **Price = AFC+ AVC + profit margin**

- Cost-plus pricing is consistent with the idea of relatively stable oligopoly prices as, providing costs are stable, prices will also remain stable in the short run, even though demand might be changing. Conversely, if costs rise on average by 5%, then prices in the industry will also be rising by a similar percentage



6.6 Factors favoring collusion

Collusion between firms, whether formal or tacit, is more likely when firms can clearly identify with each other or some leader and when they trust each other not to break agreements.

It will be easier for firms to collude if the following conditions apply

6.6 Factors favoring collusion

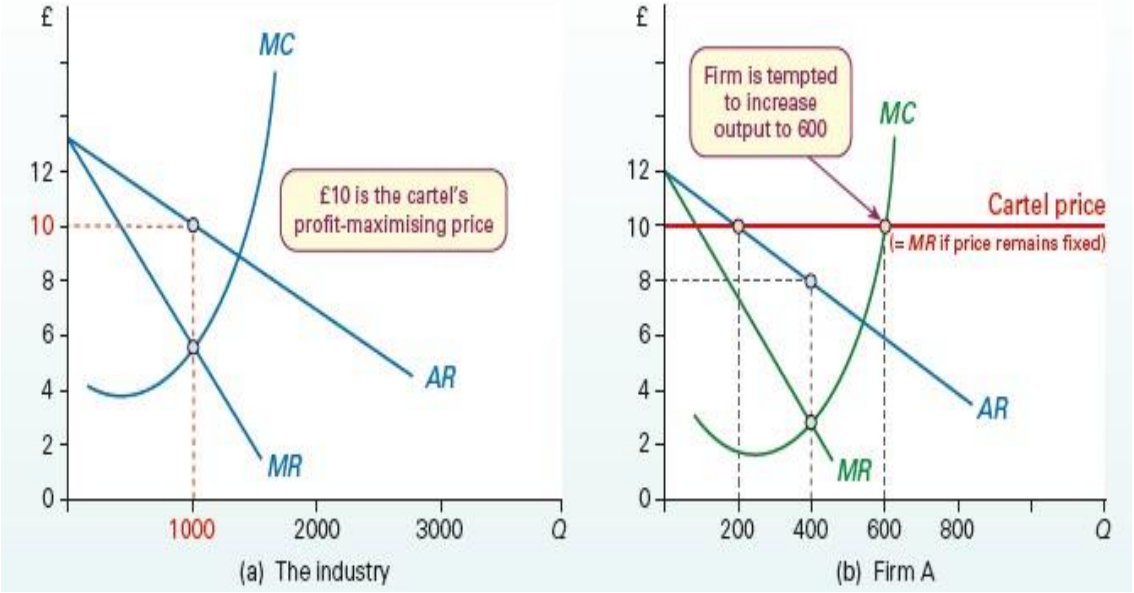
- only very few firms and all well known to each other.
- not secretive with each other about costs and production methods
- market is stable & no government measures to curb collusion
- significant barriers to entry and therefore little fear of disruption by new firms
- existence of a dominant firm
- produce similar products and can thus more easily reach agreements on price
- similar production methods and average costs, and are thus likely to want to change prices at the same time and by the same percentage.

7 Non - collusive Oligopoly

- In some oligopolies, there may only be a few (if any) factors favoring collusion. In such cases, the likelihood of price competition is greater.
- When a firm in oligopoly market compete with each other called non-collusive oligopoly
- The firm in non-collusive oligopoly tries to gain maximum share of market by developing policy & strategy to outperform or beat rivals
- Even if there is collusion, there will always be the temptation for individual oligopolists to 'cheat', by cutting prices or by selling more than their allotted quota.

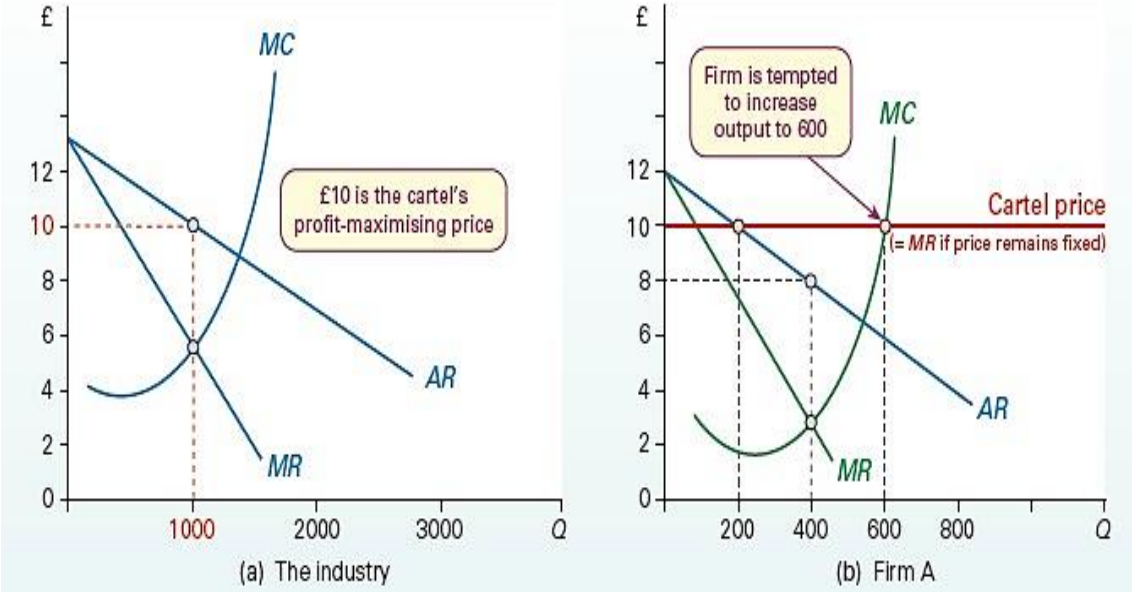
7.1 Non – Collusive Oligopoly - The Breakdown of Collusion

- Let us take the case of a cartel consisting of five equalized firms. The whole cartel is illustrated in graph below.
- Assume that the cartel sets the industry profit-maximising price of £10.
- This will give an industry output of 1000 units, which the cartel divides equally between its five members: i.e. each member is assigned a quota of 200 units.
- Now consider the second graph. This shows the position for one of the members of the cartel, firm A.



7.1 Non – Collusive Oligopoly - The Breakdown of Collusion

- Provided the cartel's price remains fixed at £10, then £10 would also be the marginal revenue for the individual firm. This will create an incentive for cartel members to cheat: to sell more than their allotted quota.
- Firm A would maximize its own profits by selling 600 units, where MC = P (= MR), provided it could do this by taking market share off the other members, and thus leaving total industry output (and hence price) unaffected. Firm A would maximise its profit by cutting its price to £8 and thereby increasing its sales to 400 units.
- The danger, of course, with either selling above quota or cutting price is that this would invite retaliation from the other members of the cartel, with a resulting price war. Price would then fall and the cartel could well break up in disarray.



7.2 Non-Collusive Oligopoly: Assumptions about rivals' behavior

- Even though oligopolists might not collude, they will still need to take account of rivals' likely behavior when deciding their own strategy.

- In doing so, they will probably look at rivals' past behavior and make assumptions based on it. There are three well-known models, each based on a different set of assumptions.

7.3 Augustin Cournot's Model

Oligopoly was made by the French economist Augustin Cournot in 1838. The model rests upon the following main assumptions:

- Each firm has to choose an output level for a given period without knowing its rivals' production plans (they might know how much their rivals have produced in the past). In other words, firms have to make decisions about production simultaneously.

- Production has long lead times and is relatively inflexible. For example, imagine a business investing in a factory or unit that has a specific production capacity. Once the building work begins and the specialised machinery has been ordered and installed, it is difficult for the firm to alter its planned output.

- Whereas output has long lead times, the market price adjusts instantly so that each firm is able to sell all the output it produces.

- The good is homogenous and each firm has the same costs. This means that all the firms in the market sell their output for the same price.

7.3 Augustin Cournot's Model

- This combination of flexible prices and inflexible output creates an interesting strategic environment. The price the firm receives for its output, in any given period, depends on the production decisions of other firms as well as its own.

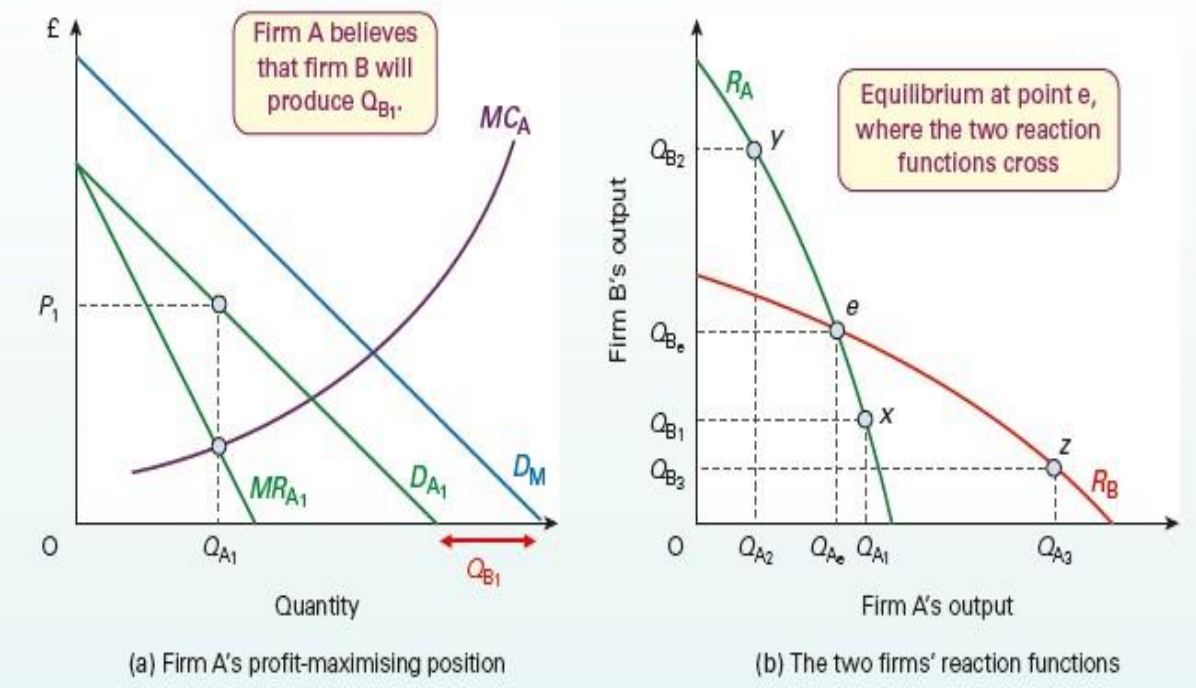
- To calculate its profit-maximising output it has to estimate the most likely output its rivals will produce. The Cournot model assumes that each firm expects its rival(s) to produce the same amount in the current period as it did in the previous period.

'3. Cournot Competition' - Video

7.3 Augustin Cournot's Model

- To make the analysis as simple as possible we will assume that the industry is a duopoly and that the two firms, A and B, each have the same costs.

- The graph below illustrates the profit-maximizing price and output for firm A. The total market demand curve is shown as DM. Assume that firm B produced QB1 units last year. Firm A, according to the model's assumption, therefore believes that firm B will continue to produce QB1 units this year.

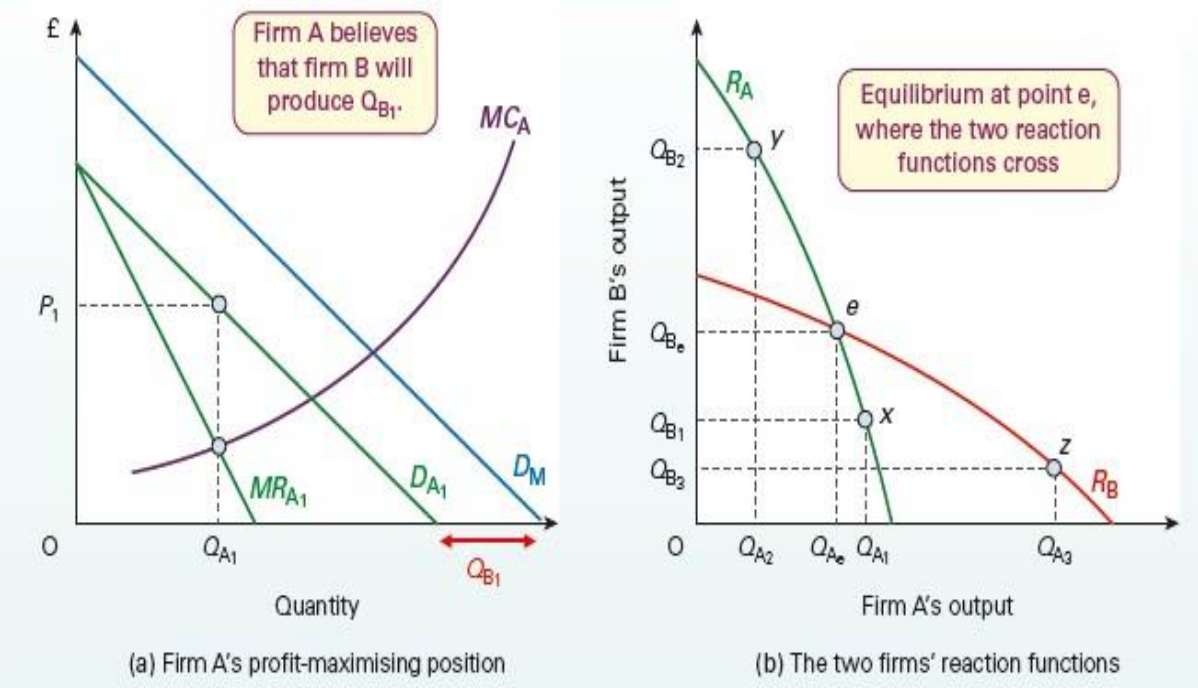


7.3 Augustin Cournot's Model

- To calculate firm A's profit-maximising output we need to identify its residual demand curve: i.e. the curve showing how much of the total demand is left for firm A, after B has supplied the market with its output.

- With firm B's output assumed to be QB1, firm A perceives its own residual demand curve to be DA1. This is the market demand curve, DM, minus QB1 units: i.e. the horizontal gap between DM and DA1 in the graph.

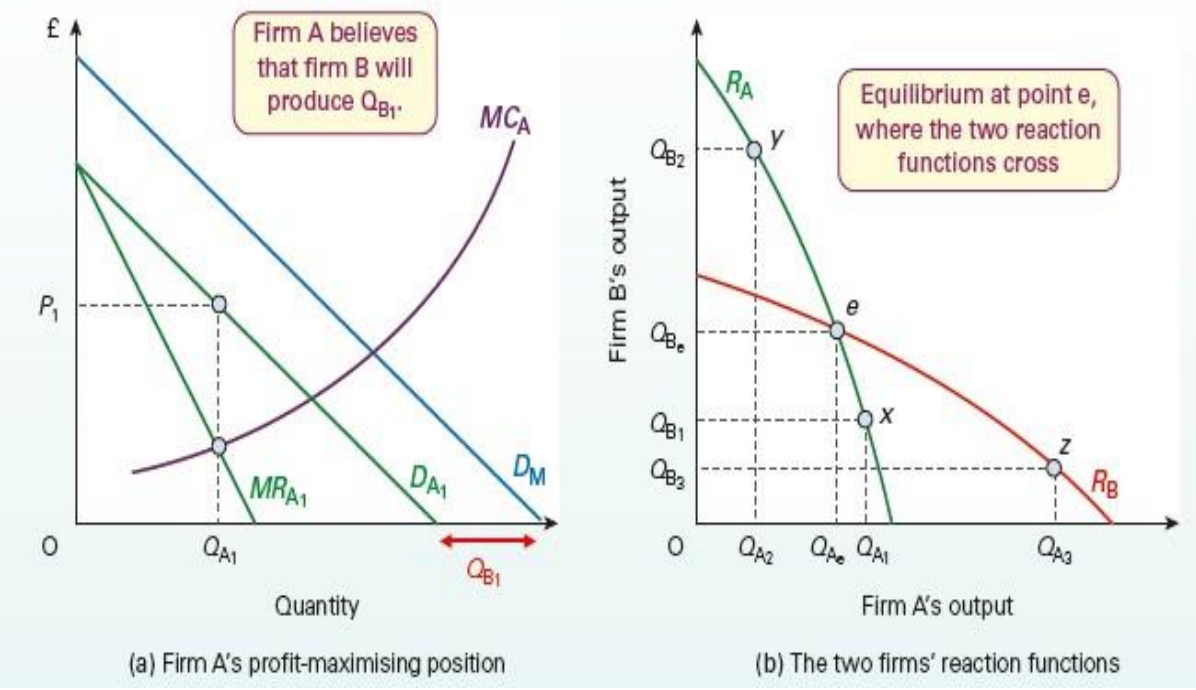
- The marginal revenue curve corresponding to DA1 is MRA1 and the profit-maximising output is QA1, where MRA1 = MCA. The market will adjust instantly so that firm A can sell QA1 units and firm B can sell QB1 units of this homogenous product for a price of P1.



7.3 Augustin Cournot's Model

- If firm A believed that firm B would produce more than QB1, its residual demand and MR curves would be further to the left and the profit-maximising quantity and price would both be lower.

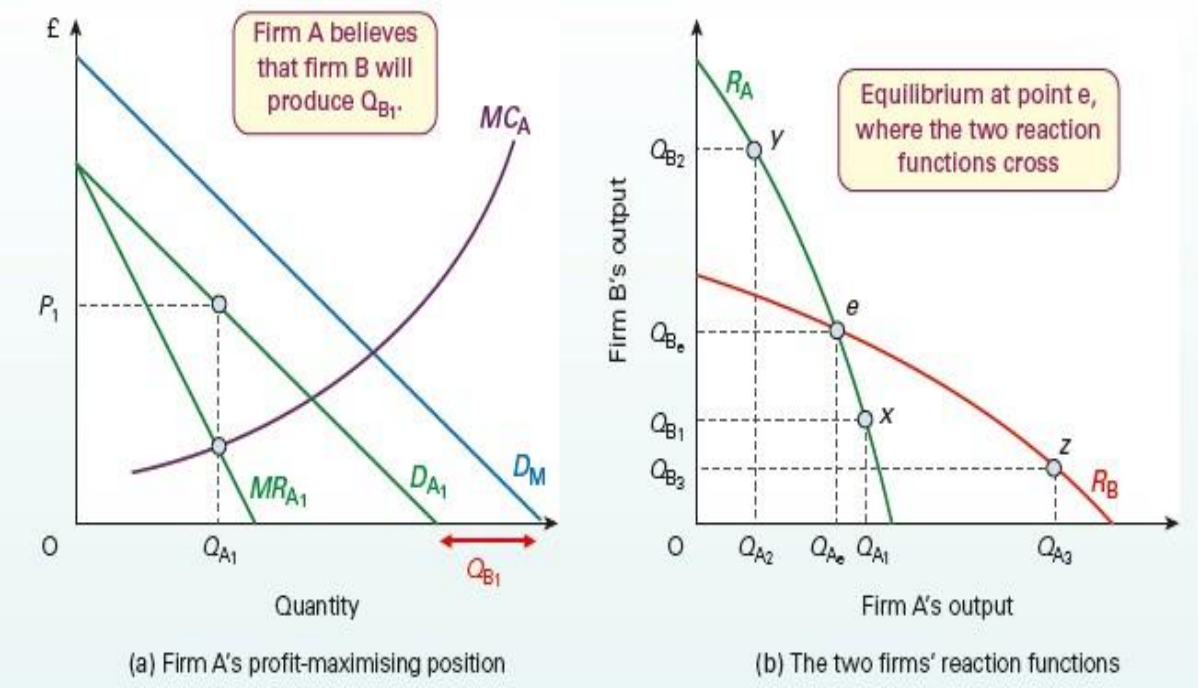
- This illustrates that the outputs are strategic substitutes – as firm A believes that firm B will produce more, its best response is to produce less.



7.3 Augustin Cournot's Model

- One limitation of the analysis so far is that it only illustrates firm A's profit-maximising best response to one predicted level of output: i.e. that firm B produce QB1 units. Firm A's reaction function, illustrated by curve RA in the second graph, shows its profit-maximising best responses to all the different outputs its rival could produce. Thus, if it perceived that firm B would produce QB2 units, it would produce QA2 units (point y).

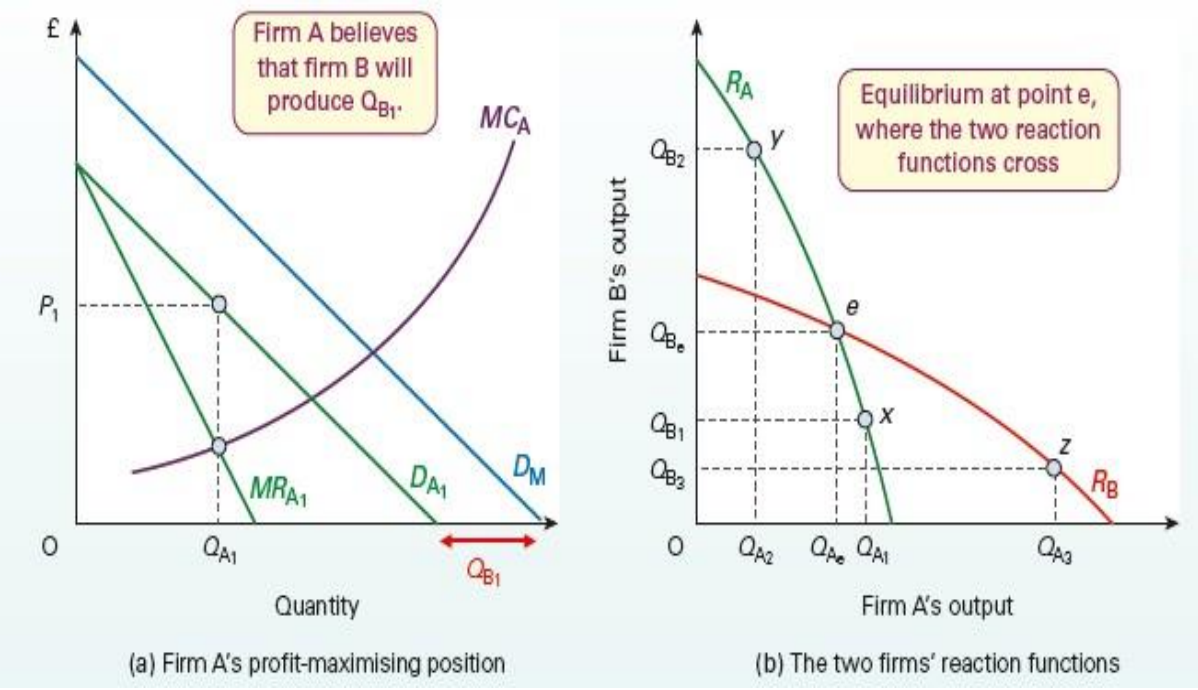
- In the second graph above, also illustrates firm B's reaction function, assuming that firm B behaves similarly to firm A and assumes that its rival will produce a particular level of output. Thus, if firm B perceived that A would produce QA3 units, firm B would produce QB3 units (point z)



7.3 Augustin Cournot's Model

What is Cournot Equilibrium?

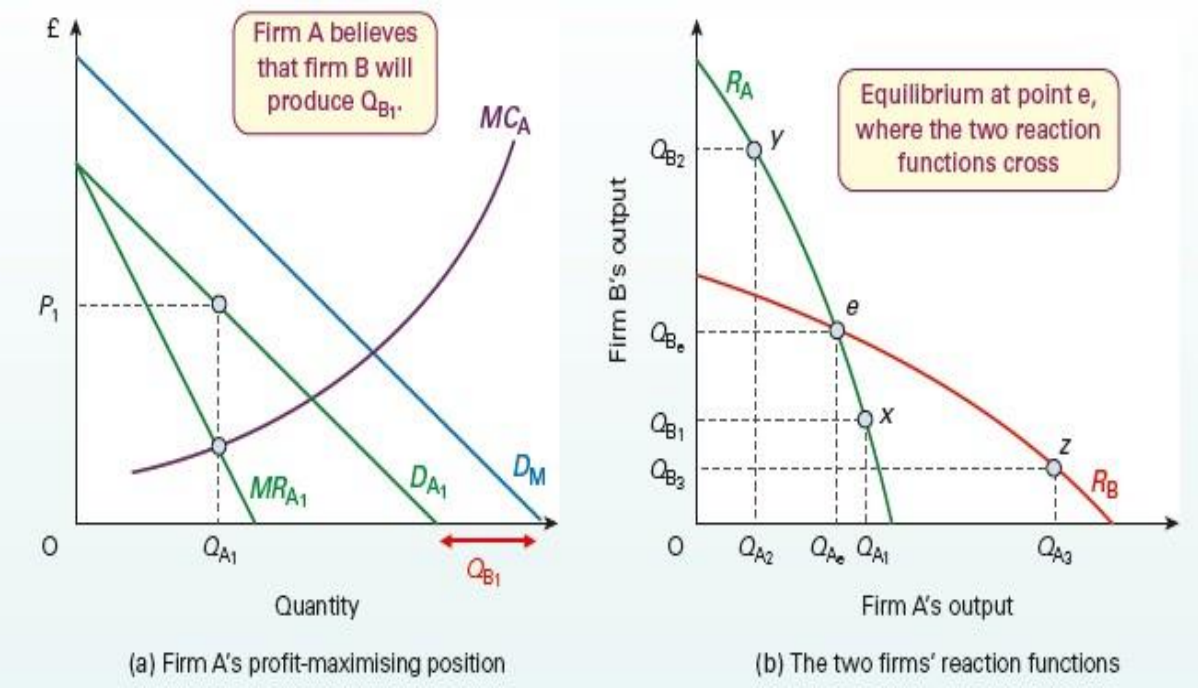
- This will occur at point e in the second graph. Only at this point will neither firm choose to adjust its output once it has discovered the production level of its rival. How is this point reached if neither firm currently produces that level of output?



7.3 Augustin Cournot's Model

How is this point (point e) reached if neither firm currently produces that level of output?

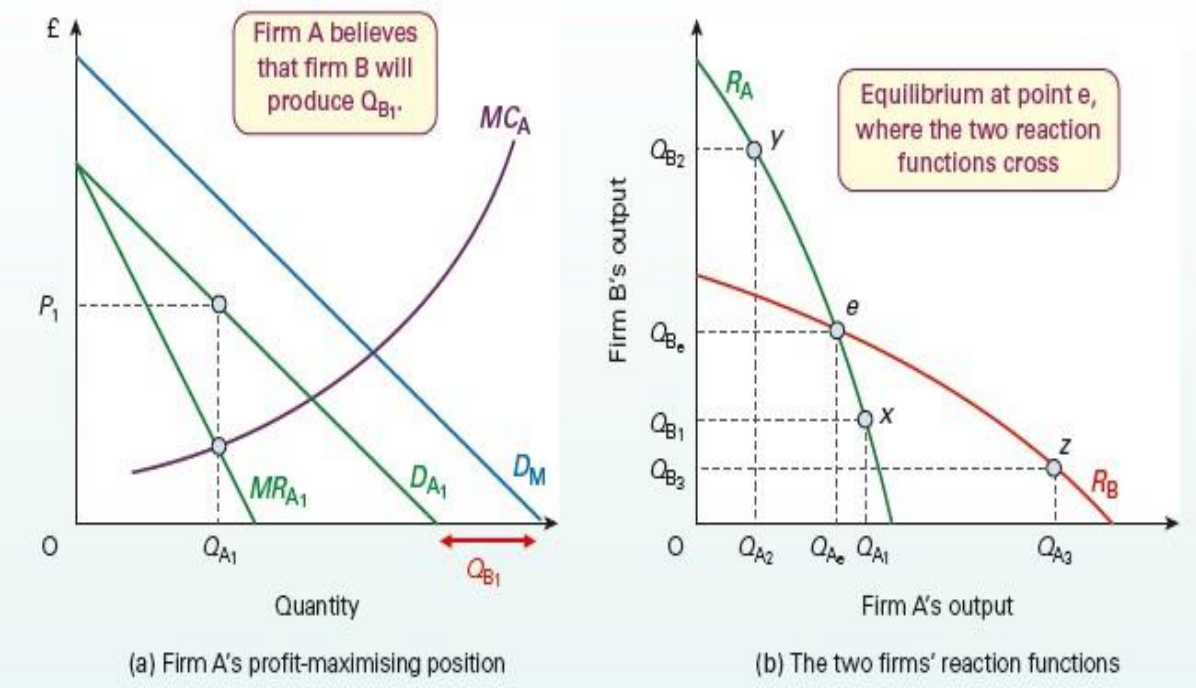
- Assume that production is at point x.
- Firm A predicts that firm B will produce QB1.
- Although firm A is on its reaction curve, firm B is not. If firm B predicts that firm A will produce QA1 its best move is not to produce QB1. It will instead produce at a point on its reaction curve vertically above this (i.e. an output greater than QB1).
- Firm A will discover that firm B has produced a greater output than it predicted. It will respond by reducing its own production level – it will move up along its reaction curve.
- This process will continue until point e is reached. Only at this point will the levels of production chosen by each firm add up to the total amount demanded.



7.3 Augustin Cournot's Model

Profit in Cournot Model

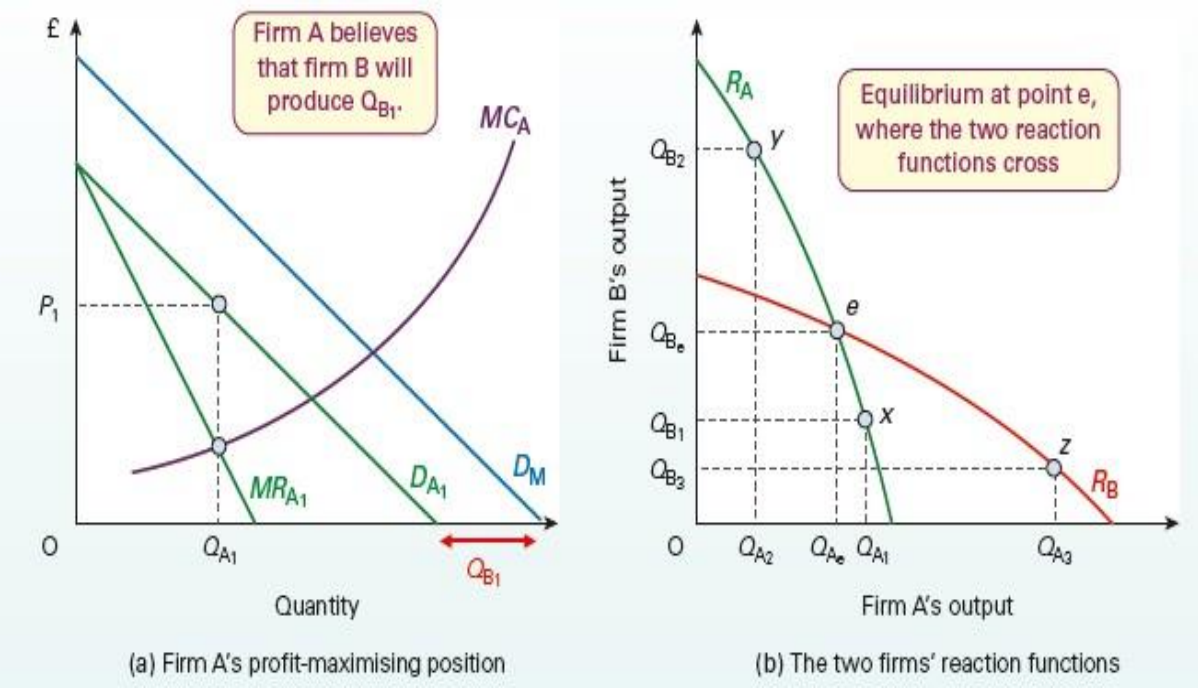
- Industry profits will be less than under a monopoly or a cartel. The reason is that price will be lower than the monopoly priceIf this were a monopoly, then to find the profit maximizing output, we would need to construct an MR curve corresponding to the market demand curve (DM). This would intersect with the MC curve at a higher output than QA1 and a higher price (given by DM).



7.3 Augustin Cournot's Model

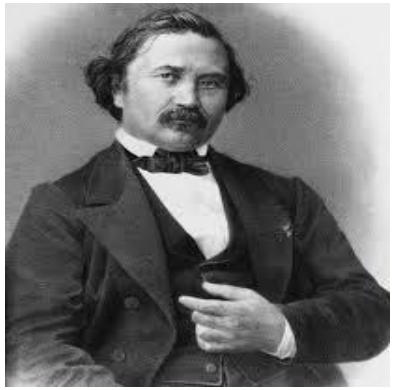
Profit in Cournot Model

- Nevertheless, profits in the Cournot model will be higher than under perfect competition, since price is still above marginal cost. However, as the number of firms in the industry increases the price would move closer to the level in a competitive market and industry profits would fall.
- The Cournot equilibrium can be derived algebraically from the market demand function and the cost functions of the two firms.



7.4 The Bertrand Model

Ano· ther famous model of oligopoly was developed by the French economist, Joseph Bertrand, in 1883. He criticized the Cournot model as he argued that firms are more likely to set prices and let the market determine the quantity sold. Bertrand again took the simple case of a duopoly where both firms have the same costs of production.



However, the conclusions of the model apply equally to oligopolies with three or more firms. It is based on the following assumptions:

- Each firm has to choose its price without knowing the price set by the other firm. It assumes its rival will charge the same price in the current period as it did in the previous period.
- Firms have to set prices in advance and decisions cannot be easily changed: i.e. prices are inflexible.
- The good is homogenous – the only thing that customers care about when they purchase the product is its price.
- Each firm can adjust its output instantly and has no capacity constraints. Therefore, if a firm charges a lower price than its rival it can immediately supply the entire market.

7.4 The Bertrand Model

- The model predicts that each firm will keep reducing its price until all supernormal profits are competed away.
  The reason for this result is simple. If firm A assumes that its rival, firm B, will hold price constant, then firm A predicts that by undercutting this price by a small amount it will gain the whole market, which it can instantly supply.
  By following the same line of reasoning firm B will be forced to respond by cutting its price.
  The model, therefore, predicts a price war with prices being reduced until they equal average total cost, with only normal profits remaining.

- This outcome is very different from the one predicted by the Cournot model.
  It is referred to as the Bertrand Paradox because the result seems counterintuitive: i.e. a duopoly results in an outcome very similar to that of perfect competition.
  The prediction changes significantly if product differentiation and/or limits in the ability of the firm to supply the entire market (i.e. capacity constraints) are introduced into the model.
  Firms may also seek to collude long before profits have been reduced to a normal level.
  Alternatively, firms may put in a takeover bid for their rival(s).

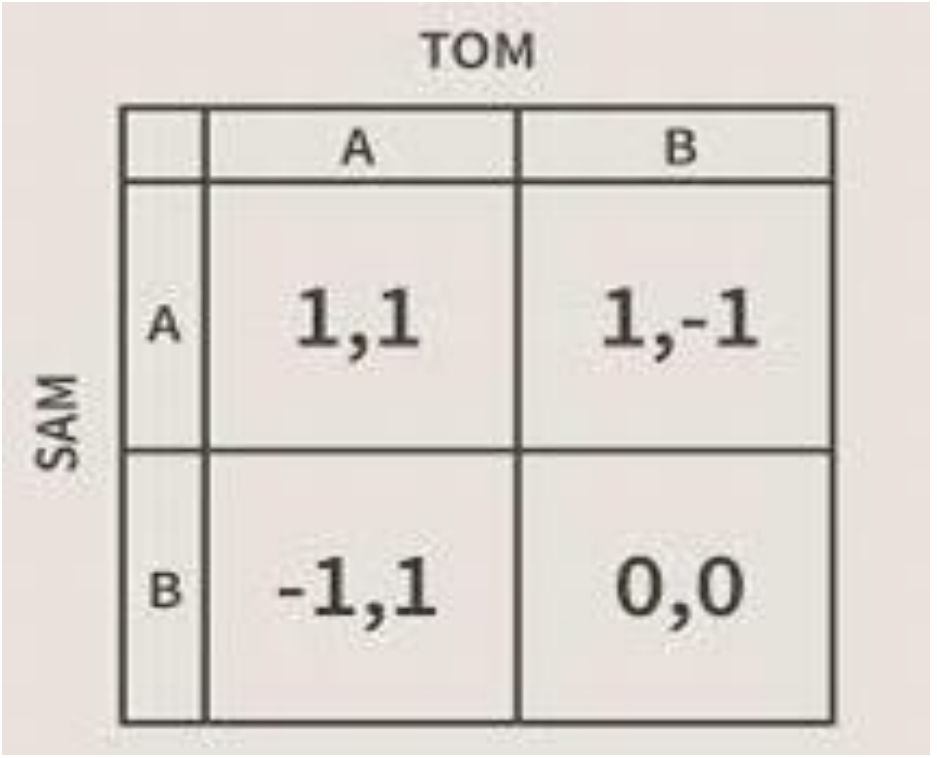
8 Nash Equilibrium

- The equilibrium outcome in either the Cournot or Bertrand models is not in the joint interests of the firms.
- In each case, total profits are less than under a monopoly or cartel. But, in the absence of collusion, the outcome is the result of each firm doing the best it can, given the assumptions it makes about what its rivals are doing.
- The resulting equilibrium is known as a **Nash equilibrium**, after John Nash, a US mathematician (and subject of the film A Beautiful Mind) who introduced the concept in 1951.
- Nash equilibrium is a concept within game theory where the optimal outcome of a game is where there is no incentive to deviate from their initial strategy. More specifically, the Nash equilibrium is a concept of game theory where the optimal outcome of a game is one where no player has an incentive to deviate from his chosen strategy after considering an opponent's choice.
- Overall, an individual can receive no incremental benefit from changing actions, assuming other players remain constant in their strategies. A game may have multiple Nash equilibria or none at all.

8 Nash Equilibrium

Example

- Imagine a game between Tom and Sam.
- In this simple game, both players can choose strategy A, to receive $1, or strategy B, to lose $1.
- Logically, both players choose strategy A and receive a payoff of $1.
- If you revealed Sam's strategy to Tom and vice versa, you see that no player deviates from the original choice.
- Knowing the other player's move means little and doesn't change either player's behavior.
- The outcome A represents a Nash equilibrium.



9 Kinked Demand Curve

Two Basic assumptions :

- If a firm decreases price, others will also do the same - So the firm initially faces a highly elastic demand curve. A price reduction will give some gains to the firm initially, but due to similar reaction by rivals, this increase in demand will not be sustained.

- If a firm increases its price, others will not follow – So the firm will lose large number of its customers to rivals due to substitution effect.

9 Kinked Demand Curve

The demand curve is more elastic above the kink and less elastic below the kink.

- If the firm decreases its price from Rs.10 to Rs.8, the price is matched by the other firms hence the curve slopes downward from K-G.

- If the firm increases its price from Rs.10 to Rs.12, the price is not matched by the other firms hence the curve slopes upward from K-F.

Kink is at point K.

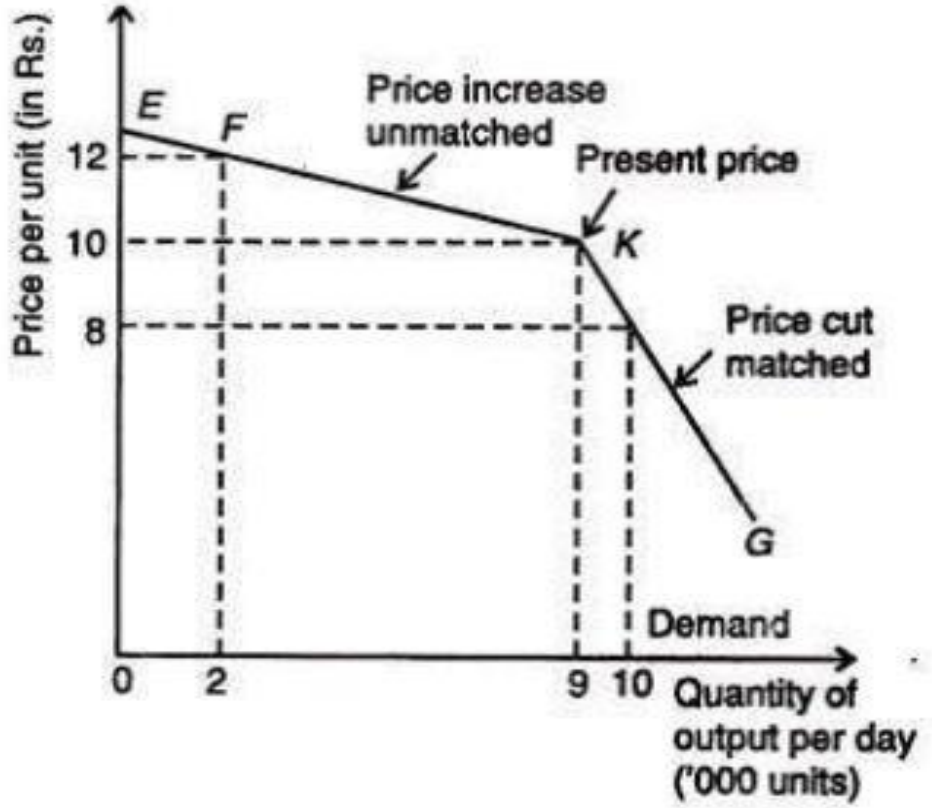


Fig. 24.12 A Kinked Demand Curve

10 Oligopoly & Public Interest

- If oligopolists act collusively and jointly maximize industry profits, they will in effect be acting together as a monopoly. In such cases, the disadvantages to society experienced under monopoly will also be experienced under oligopoly.

Furthermore, in two respects, oligopoly may be more disadvantageous than monopoly:

1. Depending on the size of the individual oligopolists, there may be less scope for economies of scale to mitigate the effects of market power.
2. Oligopolists are likely to engage in much more extensive advertising than a monopolist.

- These problems will be less, however, if oligopolists do not collude, if there is some degree of price competition and if barriers to entry are weak.
- Also, the power of oligopolists in certain markets may to some extent be offset if they sell their product to other powerful firms.
- Thus, oligopolistic producers of baked beans sell a large proportion of their output to giant supermarket chains, which can use their market power to keep down the price at which they purchase the beans. This phenomenon is known as countervailing power.
- The power of oligopolists will also be reduced if the market in which they operate is contestable. The lower the entry and exit costs for new firms, the more difficult it will be for oligopolists to collude and make supernormal profits.

10 Oligopoly & Public Interest

11 Game Theory

- Game· theory is a theoretical framework for conceiving social situations among competing players.
- In some respects, game theory is the science of strategy, or at least the optimal decision-making of independent and competing actors in a strategic setting.
- The key pioneers of game theory were mathematician John von Neumann and economist Oskar Morgenstern in the 1940s.

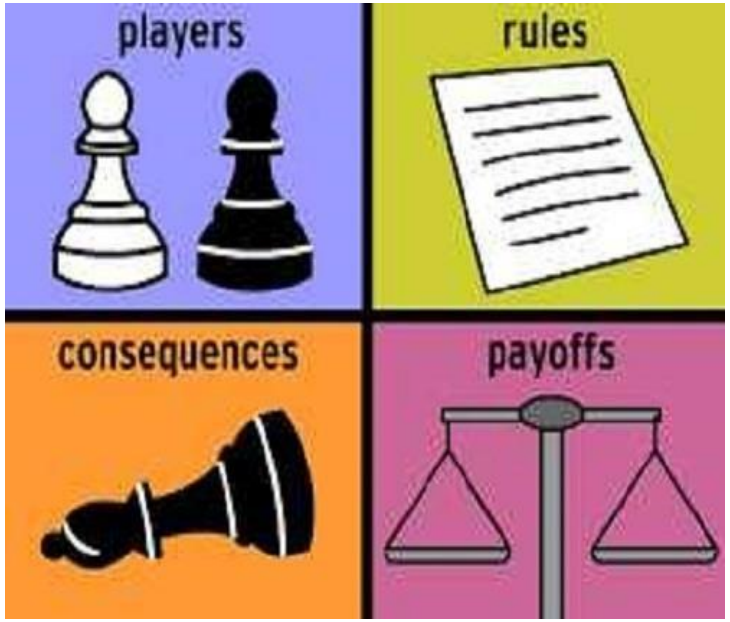
11.1 Basics of Game Theory

- The focus of game theory is the game, which serves as a model of an interactive situation among rational players.
- The key to game theory is that one player's payoff is contingent on the strategy implemented by the other player.
- The game identifies the players' identities, preferences, and available strategies and how these strategies affect the outcome. Depending on the model, various other requirements or assumptions may be necessary.
- Game theory has a wide range of applications, including psychology, evolutionary biology, war, politics, economics, and business.
- Despite its many advances, game theory is still a young and developing science.
- Fact – According to game theory, the actions and choices of all the participants affect the outcome of each.

11.1 Basics of Game Theory

Any time we have a situation with two or more players that involve known payouts or quantifiable consequences, we can use game theory to help determine the most likely outcomes.
Let's start out by defining a few terms commonly used in the study of game theory:

- **Game**: Any set of circumstances that has a result dependent on the actions of two or more decision-makers (players)
- **Players**: A strategic decision-maker within the context of the game
- **Strategy**: A complete plan of action a player will take given the set of circumstances that might arise within the game
- **Payoff**: The payout a player receives from arriving at a particular outcome (The payout can be in any quantifiable form, from dollars to utility.)
- **Information set**: The information available at a given point in the game (The term information set is most usually applied when the game has a sequential component.)
- **Equilibrium**: The point in a game where both players have made their decisions and an outcome is reached



12 Simultaneous Single – Move Games

- As we· have seen, the firm's profit-maximising strategy in a competitive oligopoly market depends, in part, on how it thinks its rivals will react to its decisions on prices, output, product development, advertising, etc.
- If this competition is a one-off event (such as firms competing for a specific contract) then it can be modelled as a **simultaneous single-move game**. This type of game is also called a single—period or one-shot game.
- A 'complete-information' simultaneous single-move game has the following characteristics. Each firm:

Is aware of all the choices available to its rival: i.e. all the decisions it could possibly make about pricing, output, advertising, product development, etc.

Is able to calculate the impact of each of these potential decisions on its own profits;

Makes its own decision without knowing the choice of its rival.

12 Simultaneous Single – Move Games

- These assumptions are very similar to those found in the Bertrand and Cournot models of oligopoly.
- Economists have actually reinterpreted both of these models as examples of simultaneous single-move games.
- Another example is the Rock–Paper–Scissors game. Each player knows the three choices available to both participants and has to decide without knowing the choice made by the other player.
- A sealed bid auction is another example, where each bidder submits a price without knowing any of the bids submitted by their competitors.
- This type of environment poses a significant challenge for a firm. As a first step it can work out the impact of each of its rivals' actions on its own profit. However, to determine its best response it would usually need to know which of these actions its rival has actually taken.
- In a simultaneous single move game, it does not have this information. How can a firm work out its best response to a rival's decision that it cannot observe?

12.1 Single – Move Games with Dominant Strategy

- In some strategic environments the firm does not have to worry about trying to work out the most likely actions of its rivals.
- Its best response remains the same, no matter what assumptions it makes about its rivals' behaviour. In the terminology of game theory, the firm has a **dominant strategy**.
- One of the best ways of illustrating this idea is to represent the strategic environment facing the firms as a **normal-form game**. A normal (or strategic) representation of a game is presented as a matrix. This matrix illustrates the pay-offs (e.g. profits) from each of the different available decisions. A simple example of a pay-off is shown in the table.
- This ex· ample illustrates the various profits two firms (X, and Y) could earn from charging two different prices – £2 and £1.80. To keep the example simple, we assume the firms have identical costs, products and demand and can only choose one or other of the two prices.

		X's price	
		£2.00	£1.80
Y's price	£2.00	A £10m, £10m	B £5m, £12m
	£1.80	C £12m, £5m	D £8m, £8m

12.1 Single – Move Games with Dominant Strategy

- Let us initially consider firm Y's position. Should it set its price at £2 or £1.80? Which decision would make it the most profit?

- If firm Y assumes that firm X chooses a price of £2, it needs to focus on the left-hand column of the pay-off matrix. Firm Y's best response is clearly to charge £1.80, earning it £12 million in profits, as illustrated in cell C. If firm Y sets its price at £2, it makes a lower profit of £10 million, as illustrated in cell A.

- If firm Y now assumes that firm X chooses a price of £1.80 it needs to focus on the right-hand column of the pay-off matrix. Firm Y's best response once again is to charge £1.80, earning it profits of £8 million, as illustrated in cell D. If firm Y sets its price at £2, it makes a lower profit of £5 million, as illustrated in cell B.

- Therefore, no matter which of the two prices firm Y assumes that firm X will charge, firm Y's best response is always to charge £1.80 as this will yield the highest possible profits. Charging £1.80 is a dominant strategy for firm Y.

		X's price	
		£2.00	£1.80
Y's price	£2.00	A £10m, £10m	B £5m, £12m
	£1.80	C £12m, £5m	D £8m, £8m

12.1 Single – Move Games with Dominant Strategy

- If we now look at the game from firm X's viewpoint, we get exactly the same result. Charging £1.80 is also a dominant strategy for firm X.
- Because both firms have a dominant strategy, the outcome of the game is easy to predict. Both firms charge £1.80 and earn £8 million in profit, as illustrated in cell D. This is the dominant strategy equilibrium of the game.
- By pursuing a strategy to maximize its own individual profit, each firm makes less money (£10 million (cell A)) than it could have if it had acted collectively (£8 million (cell D)). The game clearly illustrates the incentive each firm has to cheat on a collusive arrangement in the absence of any binding agreements

		X's price	
		£2.00	£1.80
Y's price	£2.00	A £10m, £10m	B £5m, £12m
	£1.80	C £12m, £5m	D £8m, £8m

'The Prisoner's Dilemma' – Video

12.1 Single – Move Games with Dominant Strategy

This game is an example of the **prisoners' dilemma**. The original scenario with two prisoners is discussed in more detail in Box. What exactly is the dilemma in the game above? By pursuing a strategy to maximise its own individual profit, each firm makes less money than it could have if it had acted collectively. If they both co-operated with one another (i.e. colluded) and agreed to charge the higher price of £2 they would each have made a profit of
£10 million (cell A) instead of £8 million (cell D). The game clearly illustrates the incentive each firm has to cheat on a collusive arrangement in the absence of any binding agreements

12.2 More Complex Single – Move Games

- In many instances, one or both firms will not have a dominant strategy. In these cases, a firm's best response will vary depending on what it thinks its rival will do.
- Take the example shown in Table. This is very similar to the example in Table, but has a different profit structure.
- Let us once again consider firm Y's position.
  If firm Y assumes that firm X chooses a price of £2, its best response is to charge £1.80, earning £20 million in profits as shown in cell C.
  However, if it assumes that firm X chooses a price of £1.80, its best response is to charge £2, earning £15 million in profits as shown in cell B.
  Hence, its best response changes depending on what price it thinks firm X will charge.

		X's price	
		£2.00	£1.80
Y's price	£2.00	A £18m, £5m	B £15m, £6m
	£1.80	C £20m, £3m	D £12m, £4m

12.2 More Complex Single – Move Games

- Accurately predicting firm X's decision is important for firm Y if it wants to maximize its profits. If its belief turns out to be wrong, it will make less profit.
  What is the most effective way of anticipating what your rival will do? The answer is for firm Y to try to examine the decision from the perspective of firm X. Can it successfully put itself in its rival's shoes and analyze the competition from their viewpoint?

		X's price	
		£2.00	£1.80
Y's price	£2.00	A £18m, £5m	B £15m, £6m
	£1.80	C £20m, £3m	D £12m, £4m

- If firm Y looks at the pricing decision from firm X's point of view it will see that firm X actually has a dominant strategy. If firm Y charges £2 it can see that firm X's best response is to charge £1.80. If firm Y charges £1.80, firm X's best response is also to charge £1.80. Therefore, firm Y can predict with a high level of certainty that firm X will charge £1.80 – its dominant strategy.
- Firm Y's best response, therefore, is to charge £2.00 and make a profit of £15m rather than £12m. This combination of prices in cell B is the equilibrium in the game.
- Some games can be much more complicated than the one shown in table. For example, neither firm could have a dominant strategy; there could be more than two firms and more than two choices.

12.3 Nash Equilibrium & Expected Behavior

- We looked at the concept of the Nash equilibrium. This is the position that results from everyone making their optimal decision based on their assumptions about their rivals' decisions.

- The dominant strategy equilibrium in the prisoners' dilemma and the equilibrium in previous Table are both examples of a Nash equilibrium.

- In each case, neither firm has an incentive to change its decision as it is choosing its best price in response to the price chosen by its rival.
- In fact, all dominant strategy equilibria (i.e. where both firms have a dominant strategy) are examples of Nash equilibria. Identifying any dominant strategies, if they exist, makes it easier to find the Nash equilibrium.

- In many games, there is more than one Nash equilibrium. In these cases, it is more difficult to predict the most likely outcome.

- If a firm's actual behaviour was different from its expected behaviour, then the decisions of it rivals do not represent a Nash equilibrium. In these circumstances, what the firm perceives to be its best response, based on the expected behavior of its rival, proves not to be the case when the actual behaviour of the other firm is observed. The firm will have an incentive to change its behaviour.

12.4 Repeated simultaneous - move games

- The previous analysis of simultaneous single-move games gives some useful insights but instances of one-off interactions are relatively unusual.

- In most real-world settings, firms in oligopolistic markets compete against one another on a repeated basis. Decisions about pricing, advertising, product development, etc., are made continually over the months and years that firms are in business.

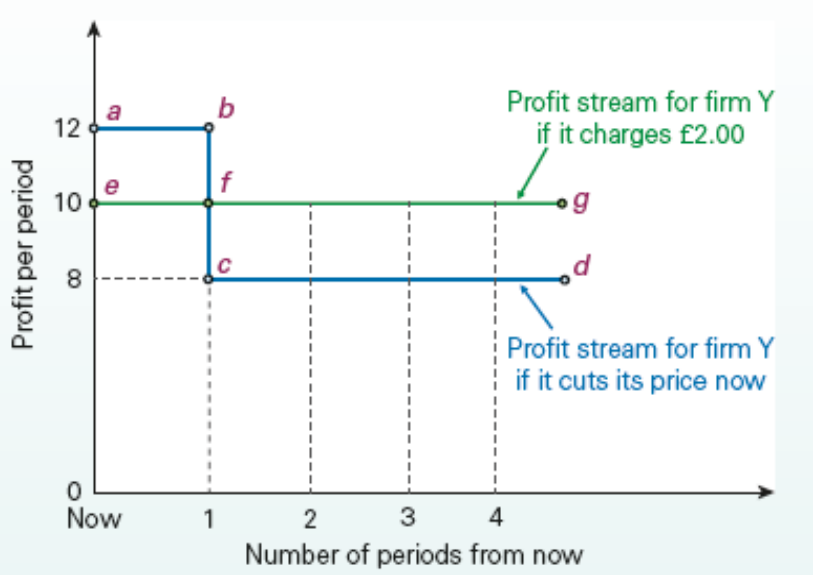
- The big difference between a single-move game and a repeated game is that each firm can now see what its rivals did in previous periods. This creates the possibility that whatever firms choose to do in one period might have an impact on the behavior of their rivals, and hence their own profits, in later periods. In particular, decisions that generate

- For example, Apple and Samsung launch new versions of their smartphone handsets on an annual basis. Do the predicted outcomes of single- move games remain the same when the game is repeated?

12.4 Repeated simultaneous-move games

- We previously examined a single-move prisoners' dilemma game in which the most likely outcome was for both firms to charge the lower price of £1.80. There was a strong incentive for both firms to cheat on any collusive agreement to fix prices at £2.00.

- Does repeated interaction between the same firms change the predicted outcome of the game? For example, if firms X and Y make the same simultaneous pricing decisions repeatedly, could their optimal strategy change so that they both start charging £2.00?

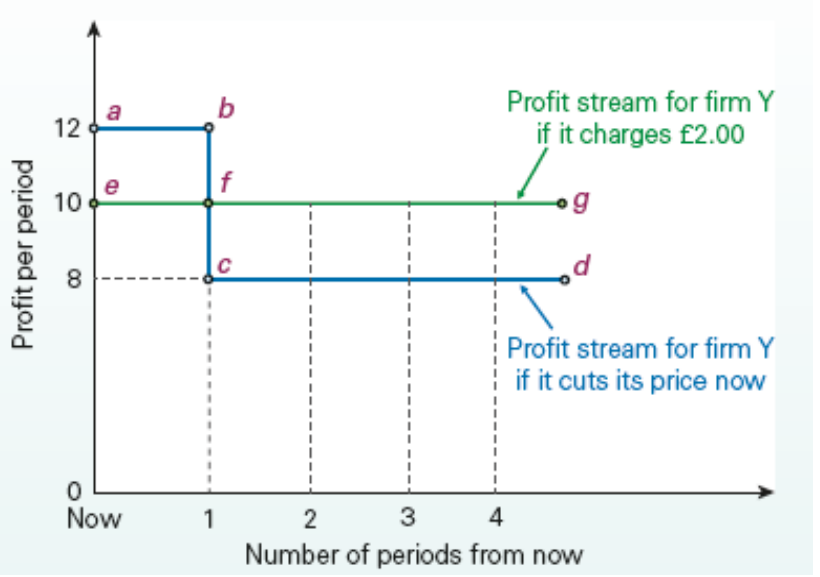


12.4 Repeated simultaneous-move games

- The profit profile for firm Y of following two different pricing strategies is illustrated in the graph above.

- By following the same dominant strategy as in the single- move game and charging a price of £1.80 (i.e. breaking the agreement), firm Y can increase its profit in the first period from £10 million to £12 million. The downside of this strategy is that its profits in all future periods will fall to £8 million as firm X responds by also charging £1.80. This is illustrated by the profit profile of a --> b --> c--> d

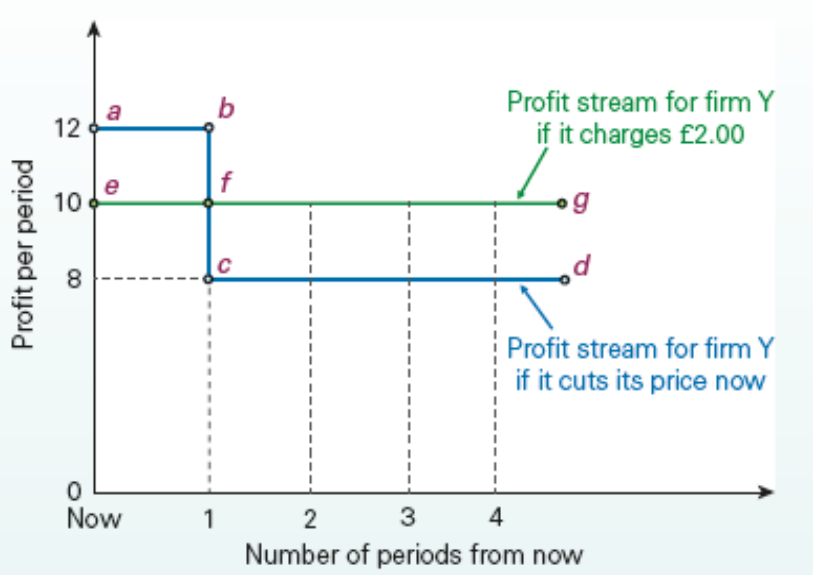
- Alternatively, firm Y could stick to the agreement and charge £2.00 in the first period. Its profit of £10 million is £2 million lower than it would have earned by charging £1.80. However, as long as it maintains its price at this level, firm X will also charge £2.00. Firm Y's profits in all future period will thus be £10 million as opposed to £8 million. This is shown by the profit profile of e --> f --> g



12.4 Repeated simultaneous-move games

After a while, both Y and X will realise that the Nash equilibrium (£1.80) is not to the advantage of either. This may persuade them to set up a stronger collusive agreement to restore prices to £2. This outcome is most likely to occur when:

- Firms value future profits quite highly;
- Firms compete against each other very frequently – there are more future time periods to benefit from the higher profits of charging £2 and area fgdc is larger;
- The higher profits from charging £1.80 in the first period are relatively small. This reduces the size of area abfe;
- A firm can quickly observe that its rival is charging the lower price. This reduces the length of time over which a firm will benefit from the higher profits of charging £1.80, again reducing the size of area abfe;
- Both firms adopt the trigger strategy, putting them in a similar position.



12.5 Backwards induction and movement to the Nash equilibrium

- Another issue is whether both firms know just how long the current product designs and costs will last – in other words, when the current round of repeated price settings will end.

- If they do, then the chances of the firm co-operating and charging higher prices is much lower. The most likely outcome is the same as for a single-move game, with the dominant strategy being to cut price.

- To understand why this is the case both firms need to think about the most likely outcome in the last period of competition (i.e. the last time prices are set before any changes in product design, costs, etc.) and then work backwards to think about the most likely outcome in earlier periods. This is called **backwards induction**.

12.5 Backwards induction and movement to the Nash equilibrium.

- The incentive for each firm to charge £2 in any period is to influence the behaviour of its rivals in future periods. However, in the last period of competition there is no future to affect, as the firms will never compete against one another again with the same product. Therefore, the last period is effectively the same as a simultaneous single- move game and both firms are highly likely to follow their dominant strategies of charging £1.80.

- If both firms realise in the last-but-one period of competition that they cannot influence what their rival will do in the last period of competition then their best strategy is also to charge £1.80. If they keep following the same line of reasoning they will both charge £1.80 in every period of competition.

- Therefore, the chances of the firms charging a higher price is much greater when they both believe that competition between them will carry on indefinitely: i.e. neither of them knows the precise date when the current type of interaction between them will come to an end

13 Sequential-move games

- So far, we have looked at simultaneous games: where firms take decisions at the same time without seeing the decision of the other firm(s).

- However, in many real-world competitive environments, one firm (the first mover) makes and implements a decision (i.e. it produces a certain output, sets a particular price or introduces a new product) before its rivals (the second movers). The second movers are then able to observe the actions of the first mover before deciding on their best response.

- These strategic environments can be studied by using **sequential - move games**.

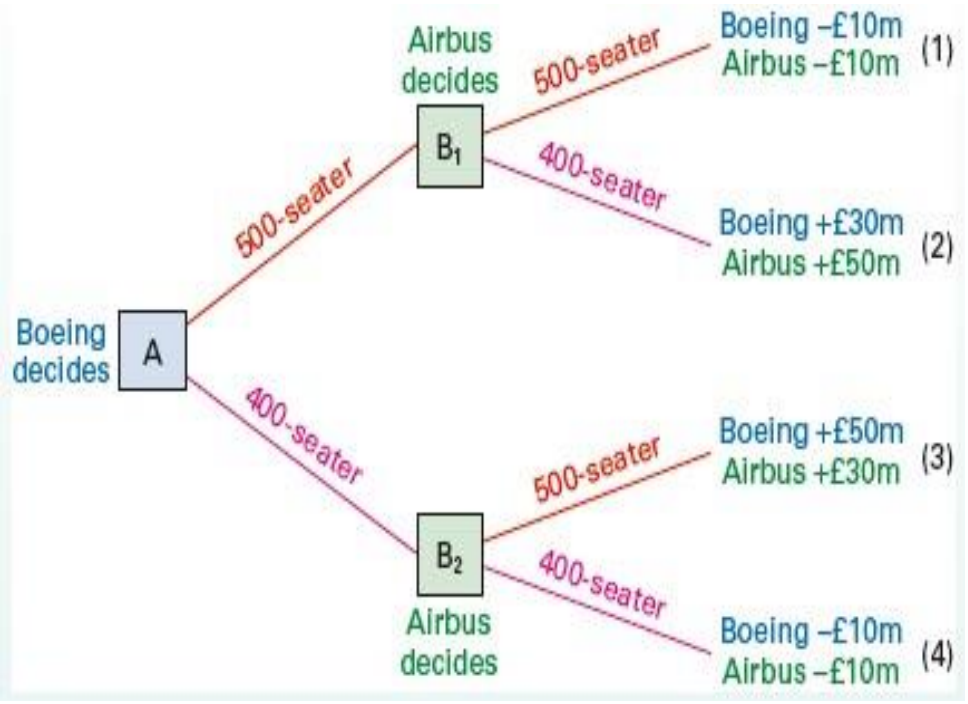
- Take the case of a new generation of large passenger aircraft that can fly further without refuelling.
  Assume that there is a market for a 500-seater version of this type of aircraft and a 400-seater version, but that the market for each size of aircraft is not big enough for the two manufacturers, Boeing and Airbus, to share it profitably.
  Let us also assume that the 400-seater market would give an annual profit of £50 million to a single manufacturer and the 500-seater would give an annual profit of £30 million, but that if both manufacturers produced the same version, they would each make an annual loss of £10 million.

13 Sequential-move games

- Assume that Boeing is the first mover and announces which plane it will build: the 400-seater or the 500-seater. Airbus then has to respond to the decision and decide which plane it will build.

- This scenario can be illustrated as a sequential-move game and is shown in the figure below.
  Sequential-move games are typically illustrated in 'extensive form' by use of **decision tree**, which identifies the possible sequence of events.

- The small square on the left of the decision tree shown in the figure below is Boeing's decision point (point A). If it decides to build the 500-seater plane, we move up the top branch. If it decides to build the 400-seater plane, we move down the bottom branch.

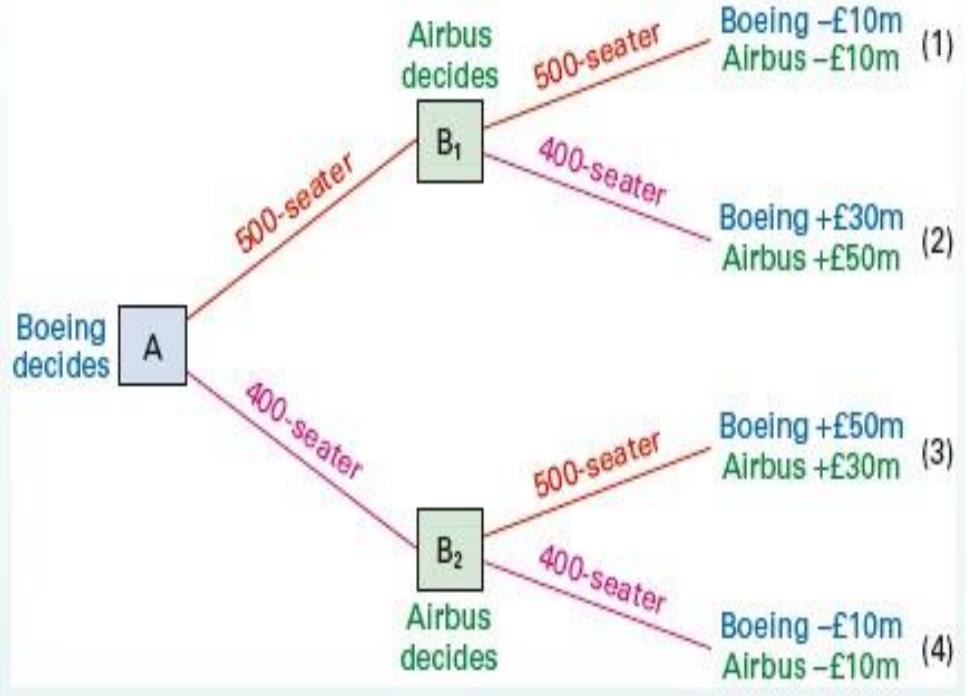


13 Sequential-move games

- Assume that it decides to build the 500-seater plane. Airbus would now have to make a decision (point B1).

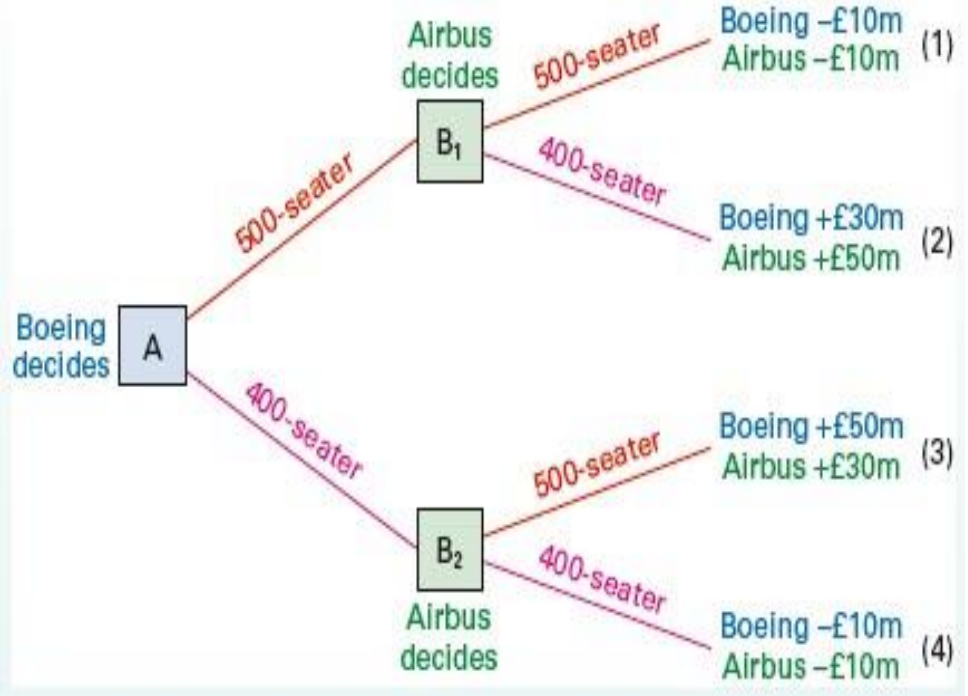
- If it too decides to build the 500-seater plane, we would move to outcome 1: a loss of £10 million for both manufacturers. Clearly with Boeing building a 500-seater plane, the best response for Airbus would be to choose the 400-seater plane: we would move to outcome 2, with Boeing making a profit of £30 million and Airbus a profit of £50 million. Airbus would be very pleased!

- Boeing's best strategy at point A, however, would be to build the 400-seater plane. We would then move to Airbus's decision point B2. In this case, Airbus's best response is to build the 500-seater plane. Its profit would be only £30 million (outcome 3), but this is better than a £10 million loss if it too buil the 400-seater plane (outcome 4).



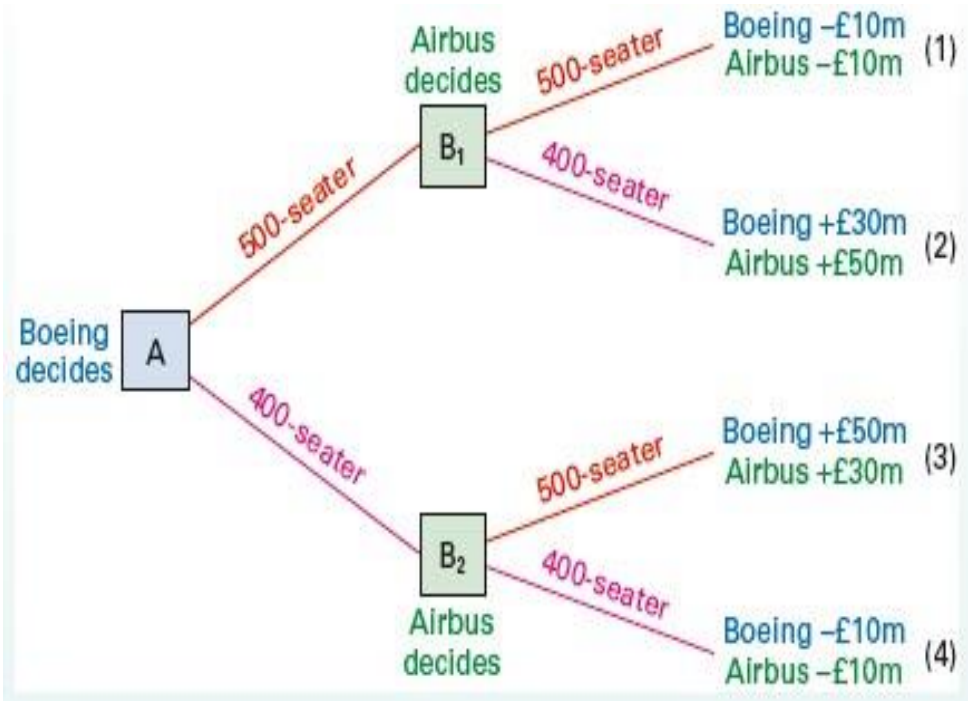
13 Sequential-move games

- With Boeing deciding first, the Nash equilibrium will thus be outcome 3.
- There is clearly a **first-mover advantage** here.
- Once Boeing has decided to build the more profitable version of the plane, the best response for Airbus is to build the less profitable one. Naturally, Airbus would like to build the more profitable one and be the first mover.
- Which company succeeds in going first depends on how advanced they are in their research and development and in their production capacity.



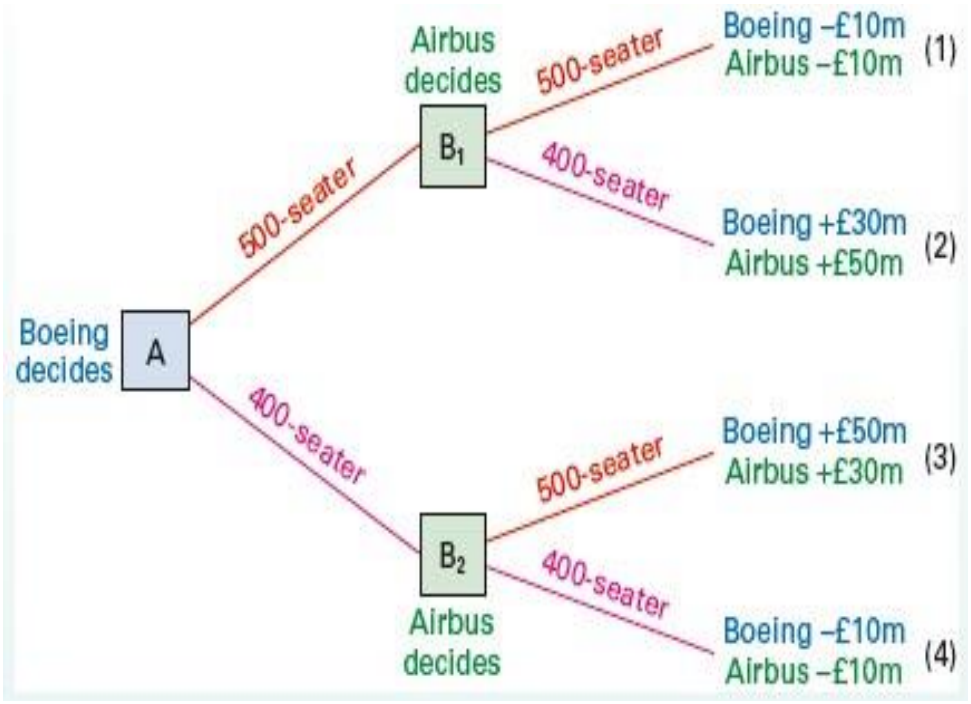
13.1 The importance of threats & promises

- In a sequential-move game, a second mover could threaten or promise to behave in a certain way in an attempt to influence the behaviour of the first mover.
- For example, in the above game Airbus could announce that it was going to build a 400-seater plane irrespective of what Boeing decides to do.
- Why would Airbus do this? If Boeing believed Airbus' announcement then its best move is to build a 500-seater plane, making a profit of £30 million as opposed to a loss of £10 million.
- Hence, the announcement influences Boeing's behaviour in a manner that is favorable to Airbus – it earns greater profits. However, there is a problem with Airbus' announcement – Boeing will probably not believe it!



13.1 The importance of threats & promises

- If Boeing actually built a 400-seater plane, Airbus' best move would be to build a 500- seater plane. Boeing can clearly see that it is not in Airbus' own self-interest to do what it said it was going to do. Therefore, the strategy is not credible and Boeing will build the 400-seater plane.
- Could Airbus take some irreversible actions so it is committed in advance to building the 400-seater plane?
- The key to the success of this policy is that Boeing must believe it: it must be credible. If this was possible, then by limiting its own options, Airbus could actually make greater profits.
- In some circumstances, inflexibility can actually improve the competitive position of the firm by altering its rivals' expectations about how it will behave.



13.2 More complex sequential-move games

- The aircraft example is the simplest version of a sequential move game, with just two companies and each one making only one key decision.
- In many business situations, much more complex trees could be constructed.
- The ‘game’ would be more like one of chess, with many moves and several options on each move.
- If there were more than two companies, the decision tree would be more complex still.

14 Assessing the simple theory of games

- Game theory provides a very useful framework for helping us to think about competitive environments where there is strategic interdependence. It highlights the importance of each firm trying to think through situations from their rival's viewpoint in order to work out their own profit maximising decision.

- In reality, many oligopolistic markets will consist of a number of firms that each have to choose from multiple options on pricing, product design, advertising, etc. Therefore it would be very difficult if not impossible for them to obtain precise information on (a) the pay-offs to all their rivals from all the possible actions they could take and (b) the impact of all the possible actions of their rivals on their own pay- offs. The approach is useful, therefore, only in relatively simple cases, and even then the estimates of profit from each outcome may amount to no more than a rough guess.

- Even if we assume that both firms have full information on all the relevant pay-offs, the outcome of real-world competition may still be different from that predicted by standard game theory. At a Nash equilibrium each firm assumes that its rivals behave in a rational manner: that they can consider all the pay-offs and successfully make decisions that maximise their own profits.

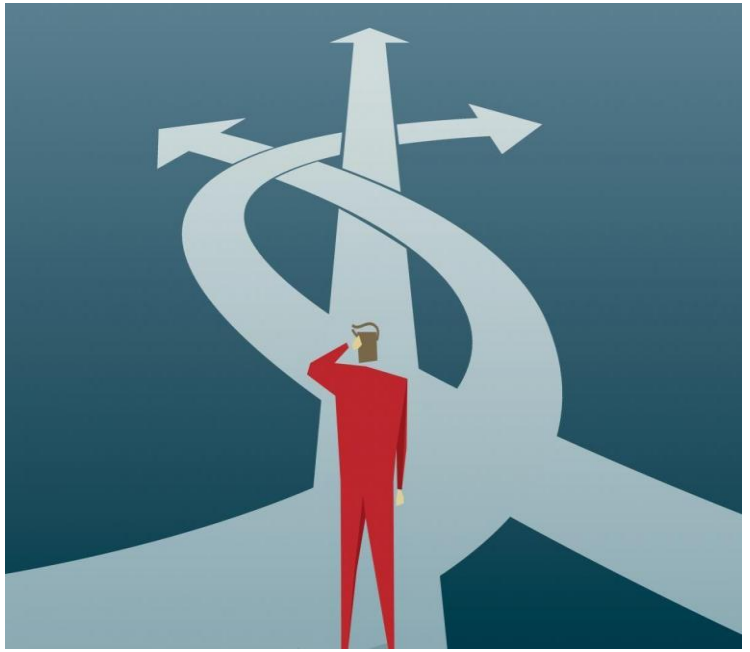
14.1 Decision making under uncertainty

- In reality, decision makers may make systematic errors, especially when faced with complicated problems. How sure can a firm be when working out its best response that its rival is in fact behaving in a rational manner? Could it mistakenly choose a suboptimal strategy?

- If firms believe there is a strong chance that their rivals will behave in an irrational manner, then the outcome of competition is much harder to predict.

- In response to this uncertainty they might play it safe by choosing the strategy that minimises their losses from the worst-case scenario from the unpredictable behaviour of their rival. Such a strategy is known as **maximin**.

- Alternatively, if they were more risk loving, they could gamble and choose the outcome that maximises their pay-off from the best-case scenario. Such a strategy is known as **maximax**.



14.2 Changing behavior patterns over time

- Behaviour may also change over time as firms learn about the consequences of their actions and the competitive environment changes.

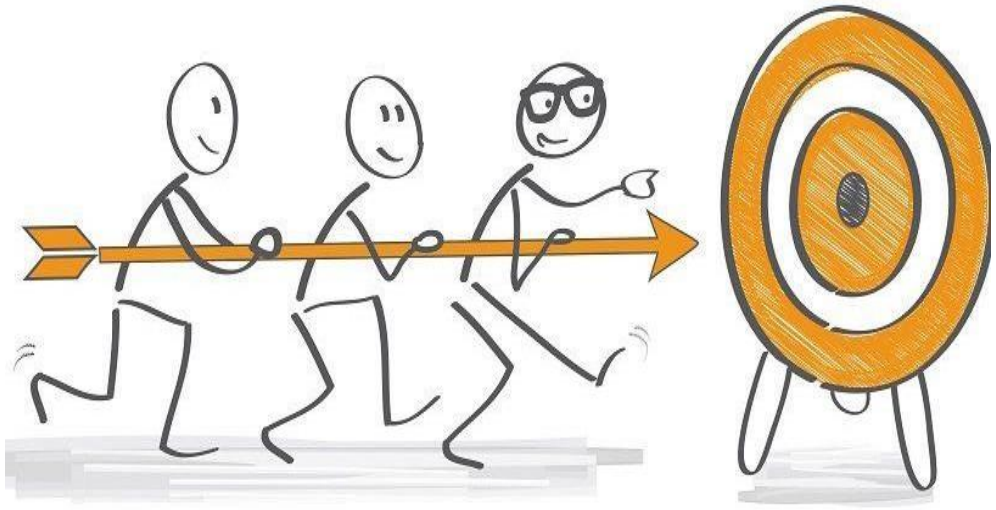
- For example, firms may compete hard for a time (in price or non-price terms) and then realise that it is making them all worse off. Firms may then start to collude and jointly raise prices and reduce advertising. Later, after a period of tacit collusion, competition may break out again. This may be sparked off by the entry of a new firm, by the development of a new product design, by a change in market demand, or simply by one or more firms no longer being able to resist the temptation to 'cheat'.

- In short, the behaviour of particular oligopolists may change quite radically over time as they find out new information.

14.3 The Objectives of Firms

- Finally, we have been assuming that firms behave selfishly – that they make decisions with the sole purpose of maximising profits. In reality, people's actions are likely to be influenced by their moral values. Business people may be unwilling to behave ruthlessly or dishonestly, or to undertake profitable activities that they regard as unfair.

- Given the lack of perfect information, uncertainty about the rationality of rivals and varying objectives of firms, simple game theory cannot predict with any accuracy what price, output and level of advertising firms will choose in the real world.



Quick Recap

- In simple terms, Monopolistic competition = Perfect competition + Monopoly
- It can be found in real world market
- Features of monopolistic competition competition
  - Large number of firms exist & work independently
  - Free entry & exit
  - Selling & advertisement cost
  - Product Differentiation
- Each firm produces a product or provides a service in some way different from those of its rivals.
- Depending on its costs and revenue, a firm might be making large profits, small profits, no profits or a loss; and in the short run, it may continue to do so.
- Due to the entry and exit of firms in perfectly competitive markets, economic profits and losses will be eliminated in the long-run and firms will only BREAK EVEN.
- Monopolistic competition involves non-price competition in the form of Product development and Advertisement

Quick Recap

- Oligopoly is derived from Greek word where “Oligo” means few and “Poly” means to sellers

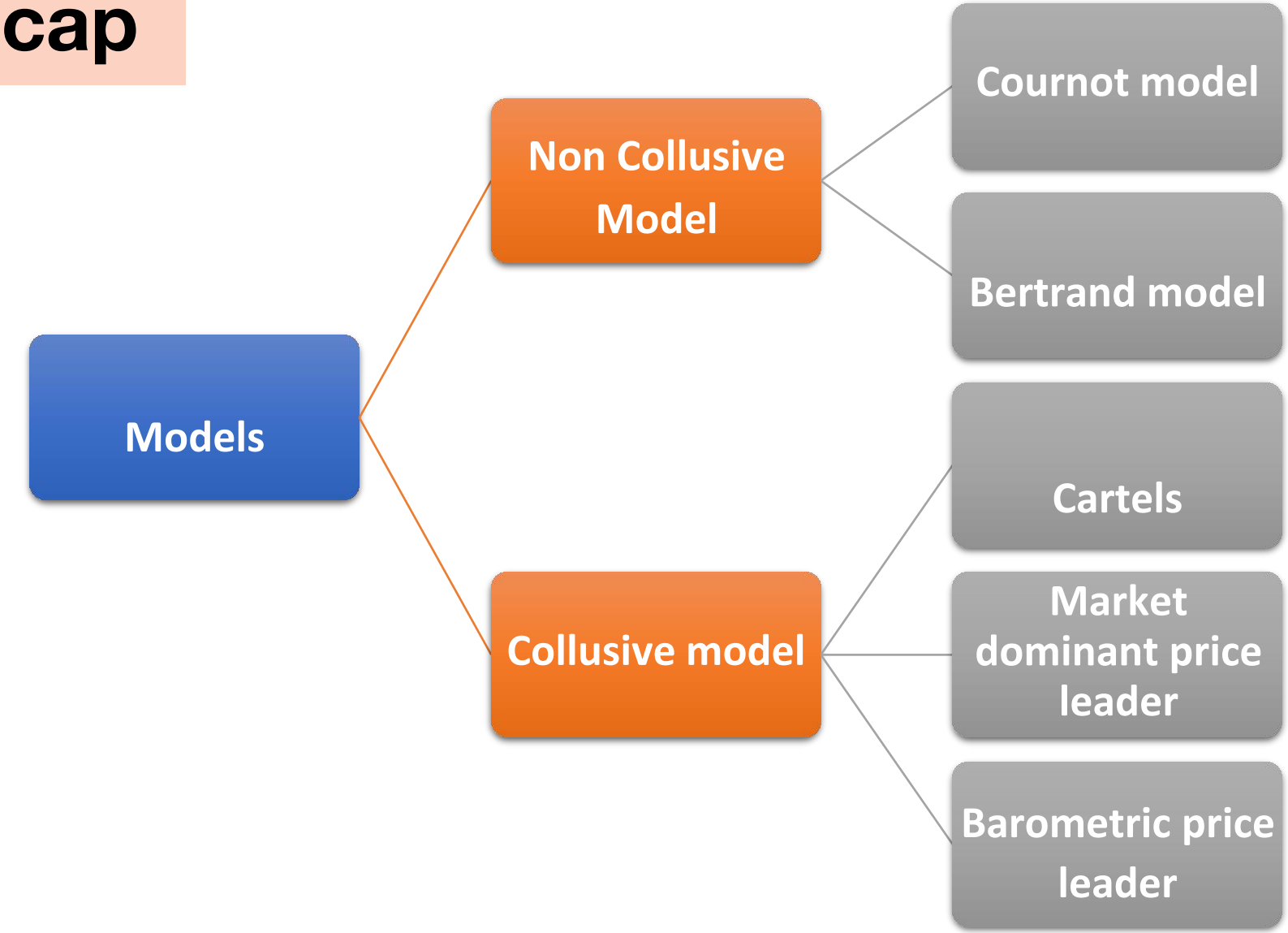
- Oligopoly market can classified on following bases.
  - Nature of product
  - Entry of firms
  - Price leadership
  - Agreement or Collusion
  - Degree of Co-ordination

- Features of Oligopoly
  - Few Sellers
  - Control Over Supply
  - Inter-dependence of firms
  - Conflicting attitudes of firms.
  - Lack of uniformity of size of firm
  - Intense Competition
  - Price rigidity
  - Advertising and selling costs
  - Indeterminateness of demand curve
  - Group behavior

Quick Recap

- The interdependence of firms in an oligopolistic market pulls them in two very different directions:
    - Each firm, by carefully studying the market and its rivals' strategy may believe that, by competing, it can gain a greater share of industry profits.
    - On the other hand, they may prefer to collude with each other by making agreements about price, output, product design, etc.
- A 'cartel' is an organization of independent firms, producing similar products, which work together to raise prices and restrict output. Example: OPEC
- Dominant price Leadership is when one firm has a dominant position in the market and the firms with lower market shares follow the pricing changes prompted by the dominant firm.
- Barometric Firm has a better knowledge of the prevailing market conditions and has an ability to predict the market conditions more precisely than any of its competitors.
- Tacit collusion may also occur where firms in the industry follow a set of 'rules of thumb' instead of a price leader. One such rule of thumb is cost-plus pricing.

Quick Recap


Models
Non Collusive Model
Cournot model
Bertrand model
Collusive model
Cartels
Market dominant price leader
Barometric price leader

Quick Recap

- Game theory is the science of strategy, or the optimal decision-making of independent and competing actors in a strategic setting.
- The key to game theory is that one player's payoff is contingent on the strategy implemented by the other player.
- Game theory has a wide range of applications, including psychology, biology, war, politics, economics, and business.
- If this competition is a one-off event (such as firms competing for a specific contract) then it can be modelled as a simultaneous single-move game.
- In some strategic environments the firm does not have to worry about trying to work out the most likely actions of its rivals. Its best response remains the same, no matter what assumptions it makes about its rivals' behavior. In the terminology of game theory, the firm has a dominant strategy.
- In many instances, one or both firms will not have a dominant strategy. In these cases, a firm's best response will vary depending on what it thinks its rival will do.
- In most real-world settings, firms in oligopolistic markets compete against one another on a repeated basis. Decisions about pricing, advertising, product development, etc., are made continually over the months and years that firms are in business.

Quick Recap

- However, in many real-world competitive environments, one firm makes and implements a before its rivals. The second movers are then able to observe the actions of the first mover before deciding on their best response. These strategic environments can be studied by using sequential- move games.

- Game theory provides a very useful framework for helping us to think about competitive environments where there is strategic interdependence. It highlights the importance of each firm trying to think through situations from their rival's viewpoint in order to work out their own profit maximizing decision. It results in the following things
  - Decision making under uncertainty
  - Changing behavior patterns over time
  - The Objectives of Firms