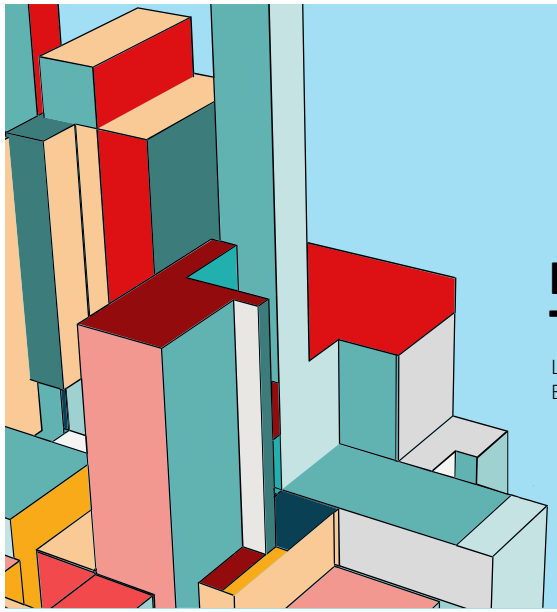

ECONOMICS TOPIC 8

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TOPIC 8: IMPERFECT COMPETITION

0 INTRODUCTION

Previously, we consider market structures that lie between the extremes of perfect competition and monopoly.

In this topic, we focus on imperfect competition market structures, ie:

Monopolistic competition

Multiple firms producing a *differentiated* product; where there is freedom of entry, but each firm has some control over its price

Oligopoly

There are few enough firms to enable *barriers* against the entry of new firm

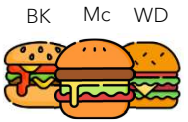
1.1 MONOPOLISTIC COMPETITION: ASSUMPTIONS

Low Barriers to Entry

Multiple firms can enter and compete for market share, making them **independent**

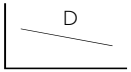
All firms are price makers

Firms can raise or lower prices without inciting a price war



Product differentiation

ie similar products with distinct marketing strategies, brand names, and qualities



Highly elastic demand

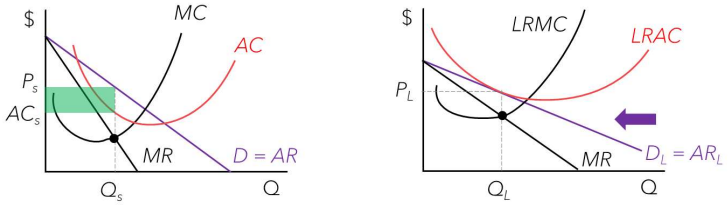
Very responsive to price changes due to many substitutes

1.2 EQUILIBRIUM OF THE FIRM

As usual, firms will maximise profits by producing where *MR* = *MC*.

In the **short run**, a monopolistically competitive firm can make profits (or losses) depending on the position of the demand (*AR*) relative to *AC*, and the elasticity of the demand curve.

In the **long run**, other firms can enter the industry and compete away profits (demand shifts left), so monopolistically competitive firm will only be able to cover average cost at *AR* = *AC*.

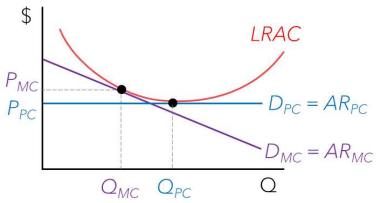


(a) short run (b) long run

2.1 COMPARING MONOPOLISTIC COMPETITION WITH PERFECT COMPETITION

Firms operating in **monopolistic competition** will typically:

- produce ***lower quantities*** than firms operating in perfect competition
- produce at a ***higher price*** than firms in perfect competition
- have *excess capacity*, ie in the long run, firms under monopolistic competition will produce at an output below that which minimises average cost per unit.



Perfectly competitive firms produce Q_{PC} at price P_{PC}

Monopolistically competitive firms produce Q_{MC} (< Q_{PC}) at price P_{MC} (> P_{PC})

2.2 COMPARING MONOPOLISTIC COMPETITION WITH MONOPOLY

Firms operating in **monopolistic competition** may:

- charge *lower prices* than monopolists
- be *more efficient* (due to competition)

However, **monopolists** may:

- benefit from ***economies of scale***
- invest in research and development to improve efficiency

3.1 OLIGOPOLY: FEATURES

A market structure with a small number of firms, none of which can keep the others from having significant influence, e.g. news media, smartphones, car manufacturing.

Features

Barriers to entry

Vary between different industries, but mostly due to economies of scale, regulatory, accessing supply and distribution channels, capital requirements, and brand loyalty

Interdependence

Each firm will be affected by its rivals' decisions and likewise, its decisions will affect its rivals; firms recognise the importance of this interdependence and its affects their decisions.

3.2 OLIGOPOLY: TYPES

Types

Duopoly

is an oligopoly where there are just two firms in the market

Collusive oligopoly

exists when oligopolists **agree** (formally or informally) **to limit competition** between themselves.

They may:

- set output quotas
- fix prices
- limit product promotion or development
- agree not to "poach" each other's markets

Non-collusive oligopoly

exists when oligopolists have **no agreement** between themselves, either formal, informal or tacit.

Non-collusion (ie competition) will generally lead to lower overall industry profits.

Collusion could lead to an overall increase in industry profits.

4 COLLUSIVE OLIGOPOLY

Cartel

A collection of independent businesses or organisations that collude to manipulate the price of a product or service

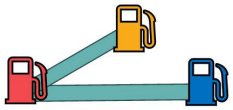
OPEC

Organisation of Petroleum Exporting Coutries (OPEC) consisting of 13 oil-producing countries

In many countries, cartels are illegal.

Tacit

Situation where firms have an unspoken agreement to engage in a joint strategy



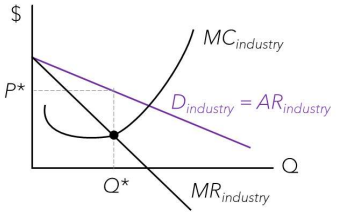
Several gas stations located in a small town. Some are close to their competitors. Almost every gas stations have different prices.

4.1 CARTELS

A cartel will maximise profits if it acts like a monopoly, *ie* profits will be maximised when *MR* = *MC* for the industry

Having agreed to sell at price *P**, the firm have to divide the market (*Q**) between them. They can do this by:

- non-price competition *eg* advertising
- **quotas**, ie the output that a given member is allowed to produce (*production quota)* or sell (*sales quota*) – this is likely to be based on current market share.

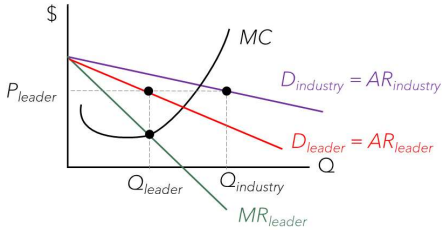


It may be in the interests of firms in a cartel to introduce entry barriers, *eg* by buying up distributors or advertising heavily

4.2 TACIT COLLUSION

Dominant firm price leadership – when firms (the followers) choose the same price as that set by a dominant firm in the industry (the leader).

To set the price, the leader may need to make assumptions, *eg* that it will maintain a constant market share. These assumptions may or may not hold in practice.



The leader sets its price at the output level (Q_{leader}) where its *MR* = *MC*.

The rest of the industry adopts the same price (P_{leader}). The industry quantity ($Q_{industry}$) is determined by the market demand curve ($D_{industry}$)

4.2 TACIT COLLUSION

Barometric firm price leadership – where the price leader is the one that is believed to reflect market conditions in the most satisfactory way; the barometer firm may (frequently) change

Average cost pricing – where a firm sets its price by adding a certain percentage for (average) profit on top of the average cost

Price benchmarks – this is a price that is typically used; firms, when raising prices, will usually raise it from one benchmark to another, *eg* from $9.50 to $9.99

Shadow pricing – when firms observe each other's pricing and ensure that they all remain at similar levels

5 NON-COLLUSIVE OLIGOPOLY – MODELS

The three models used to describe the rivals' behaviour are:

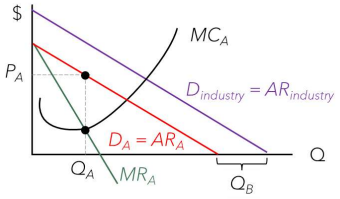
1. the **Cournot model –** a *duopoly* model where each firm makes its price and output decisions on the assumption that its rival will produce a particular **quantity**; this is most likely when the market is stable and the rivals have been producing relatively stable quantities for some time

2. the **Bertrand model –** a model where each firm is assumed to set a particular **price** and stick to it; this is most likely when firms want to avoid changing prices too often

3. the **kinked demand theory –** a model that assumes oligopolists face a 'kinked' demand curve at the current price: demand being significantly more elastic above the current price than below. The effect of this is to create a situation of price stability

5.1 COURNOT AND BERTRAND MODELS

Under the **Cournot model**, industry profits will be less than under a monopoly or a cartel.



Firm A determines its demand curve (D_A) to be the industry demand curve ($D_{industry}$) less the assumed quantity that Firm B produced (Q_B). It then sets its price at the profit-maximizing output level (Q_A)

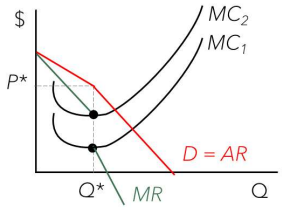
Under the **Bertrand model** of duopoly, each firm assumes its rival will hold price constant. The result is a price war until all profit has been competed away. In practice, firms are likely to:

- collude before this happens
- put in a **takeover bid** for their rival(s) – one firm attempts to purchase another by offering to buy their shares

Under both the Cournot and Bertrand models, equilibrium profits will be lower than they could be, and will result in a *Nash equilibrium*.

5.1 KINKED DEMAND THEORY

- if an oligopolists ***raises*** its price, its rivals ***will not*** follow – this leads to a *relatively elastic* demand curve at prices *higher* than the current price
- if an oligopolists ***cuts*** its price, its rivals ***will*** follow – this leads to a *less elastic* demand curve at prices *lower* than the current price



The demand curve is relatively *elastic* above the equilibrium price (P^*), since if the firm raises its prices, the other firms will not react and it will lose market share.

The demand curve is less *elastic* below the equilibrium price (P^*), since if the firm lowers its prices, the other firms will do likewise and it will gain few extra sales.

If *MC* is anywhere between MC_1 and MC_2, profit is maximised at Q^*

6 NON-COLLUSIVE OLIGOPOLY – GAME THEORY

Game theory (or the theory of games) is the study of alternative strategies that players (in this case, oligopolists) may choose to adopt, depending on their assumptions about their rivals' behaviour.

Single-move games

or a single-period game involves just one move by each player, *eg* deciding on the fee to tender for a particular construction project.

Multiple-move games

or repeated-move game involves sequential movements by players, as each player responds to the action of its rival.

Decision trees

is a diagram showing the sequence of possible decisions by competitor firms and the outcome (in terms of each firm's profit) of each combination of decisions.

6.1 GAME THEORY – SINGLE-MOVE GAMES STRATEGIES

- A *cautious* firm is likely to opt for a **maximin** strategy
  – choosing the policy that *maximises its minimum* possible payout.

- An *optimistic* firm is likely to opt for a **maximax** strategy
  – choosing the policy that has the *best* possible outcome.

If all possible approaches (including maximin and maximax approaches) lead to the *same strategy*, it is known as a **dominant strategy game.** In other words, a dominant strategy is where one firm has a "best" strategy no matter what the other firm(s) does.

6.1 SINGLE-MOVE GAMES: NASH EQUILIBRIUM

When all firms have a dominant strategy, the outcome is a ***dominant equilibrium***.
Consider the example of two firms (Firm A and Firm B), each with two possible pricing strategies:

		Firm B		Row Min	Row Max
	(A,B)	High	Low		
Firm A	High	(6, 4)	(2, 6)	2	6
	Low	(8, 0)	(4, 2)	4	8

Consider Firm A

- If Firm B goes *high*, then Firm A should go *low*.
- If Firm B goes *low*, then Firm A should go *low*.

That is, Firm A should *always* go *low*, so *low* is a dominant strategy for Firm A.

Maximin: max(2, 4) = 4 (Low)
Maximax: max(6, 8) = 8 (Low)
} Dominant strategy is low.

- the **maximin** strategy for Firm A is low, since the minimum Firm A could end up with if it goes low is 4, which is greater than the minimum if it goes high (2)
- the **maximax** strategy for Firm A is low, since the maximum Firm A could end up with if it goes low is 8, which is greater than the maximum if it goes high (6)

6.1 SINGLE-MOVE GAMES: NASH EQUILIBRIUM

		Firm B		Row Min	Row Max
	(A,B)	High	Low		
Firm A	High	(6, 4)	(2, 6)	2	6
	Low	(8, 0)	(4, 2)	4	8
	Col Min	0	2		
	Col Max	4	6		

Similarly, **consider Firm B**

- If Firm A goes high, then Firm B should go low.
- If Firm A goes low, then Firm B should go low.

That is, Firm B should *always* go low, so low is also a dominant strategy for Firm B.

Maximin: max(0, 2) = 2 (Low)
Maximax: max(4, 6) = 6 (Low)
} Dominant strategy is low.

- the **maximin** strategy for Firm B is low, since the minimum Firm B could end up with if it goes low is 2, which is greater than the minimum if it goes high (0)
- the **maximax** strategy for Firm B is low, since the maximum Firm B could end up with if it goes low is 6, which is greater than the maximum if it goes high (4)

Logically, Firm A and Firm B will go with their dominant strategy (low).
And by knowing the other firm's decision does not change either Firms' behaviour.
This outcome represents a Nash Equilibrium.

6.1 SINGLE-MOVE GAMES: PRISONERS' DILEMMA

A Nash equilibrium is the position resulting from everyone making their optimal decision based on the actual decisions made by their rivals. Without collusion, neither firm can improve its payoff given the other firm's strategy, so there is no incentive for any firm to change its position.

		Firm B: High	Firm B: Low
Firm A	High	**(6, 4)**	(2, 6)
	Low	(8, 0)	**(4, 2)**

However, the Nash equilibrium does not always mean that the most optimal strategy is chosen.

The two firms might charge low prices, but they would both be better off if they colluded to charge high price!

The **prisoners' dilemma** is a scenario under which there are two or more firms (or prisoners) who, by attempting independently to choose the best strategy, based on what other(s) are likely to do, end up in a worse position than if they had co-operated for the start.

6.1 SINGLE-MOVE GAMES: PARETO OPTIMAL.

A single-move **Pareto optimal** outcome refers to a situation within a single instance of a game (not repeated or averaged over time) where **no player can be made better off without making at least one other player worse off.**

	High	Low
High	**(3, 3)**	(0, 5)
Low	(5, 0)	**(1, 1)**

- (3, 3) is *Pareto optimal*, because neither player can improve their payoff without hurting the other.
- (1, 1) is *Nash equilibrium* but not Pareto optimal, because both players could switch to (3, 3) and be better off.

	High	Low
High	**(3, 3)**	(0, 0)
Low	(0, 0)	**(1, 1)**

- (3, 3) is both a *Nash* equilibrium and Pareto *optimal.*
- (1, 1) is *Nash equilibrium* but not Pareto optimal

Some Nash equilibria can also be Pareto optimal but **not all** Nash equilibria are Pareto optimal.

6.2 MULTIPLE-MOVE GAMES: TIT-FOR-TAT

One of the simplest strategies in a repeated game is **tit-for-tat**, where a firm will cut prices or make some other aggressive move, only if the rival does so first.

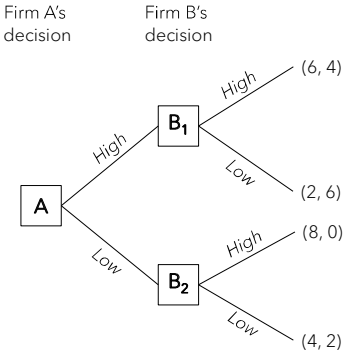
		Firm B: High	Firm B: Low
Firm A	High	(6, 4)	(2, 6)
	Low	(8, 0)	(4, 2)

The two firms might each initially charge high prices, at the same time making it clear to the other firm that it will cut its price in response to a cut in price by the other firm.

If the firm makes it clear to its rival that it will respond in this way (ie if the firm makes a threat), the rival will be less likely to adopt the aggressive tactic.

In many situations, an oligopolist will make a threat (or promise) that it will act in a certain way. As long as the threat (or promise) is ***credible*** (i.e. its competitors believe it), the firm can influence its rivals' behaviour and thus gain in some way.

6.3 DECISION TREES



The *timing* of decisions by different firms may be important. A **first-mover advantage** is when a firm gains from being the first one to take action.

A **decision tree (or game tree)** is a diagram showing the sequence of possible decisions by competitor firms and the outcome (in terms of each firm's profit) of each combination of decision. It can be used to illustrate the different choices available to firms.

From the decision tree, Firm A can see that Firm B will choose a *low* price, whatever Firm A does. Given this, Firm A will choose a *low* price. In this case, there is no first-mover advantage, as the outcome is the dominant equilibrium, *ie A – low, B – low.*