Understanding Markets

EC8005 – Lecture 8
2014

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Course Outline

1. Course Introduction
2. Demand and Supply
3. Market Equilibrium and Applications
4. Elasticity and its Applications
5. The Consumer and Demand
6. The Firm and Supply
7. Market Structures
8. Markets and States
9. Microeconomic Policy Issues in Ireland

**EC8005b Understanding Markets**

Topic 8: Market Structures

Focus: Treatment of the implications of different market structures.

Structure:

1. The Market Structure Spectrum
2. Perfect Competition
3. Monopoly
4. Perfect Competition v's Monopoly
5. Monopolistic Competition
6. Oligopoly and Game Theory

1. Market Structure Spectrum

Less Competition

| Perfect Competition | Monopolistic Competition | Oligopoly | Monopoly |
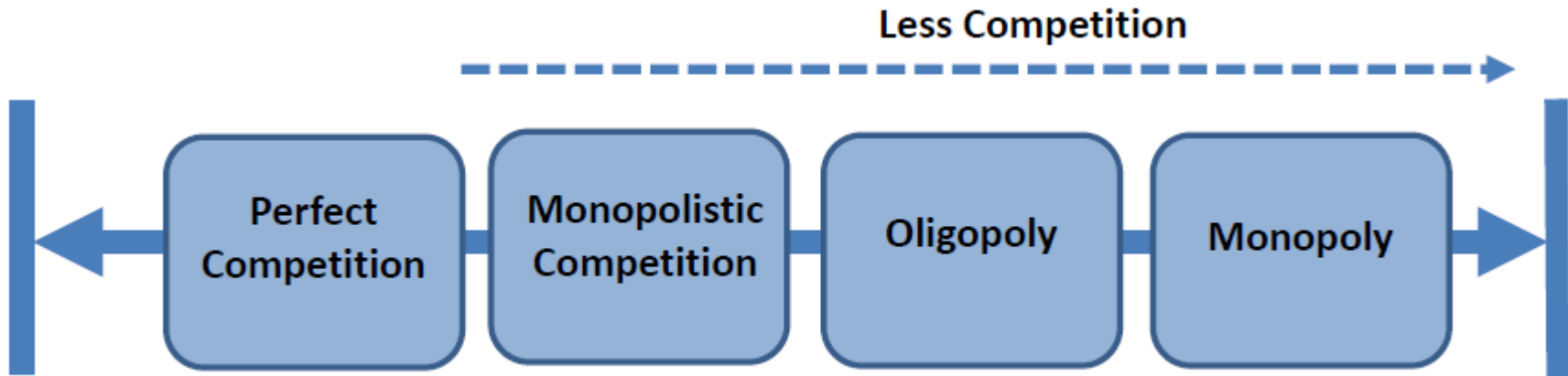
- ❑ Markets can be divided into categories depending on degrees of competition and market power.
- ❑ Market structure is a function of:
  1. No. of firms in the market.
  2. The nature of the product – differentiated (heterogeneous) or undifferentiated (homogenous).
  3. Extent of information available to market participants.
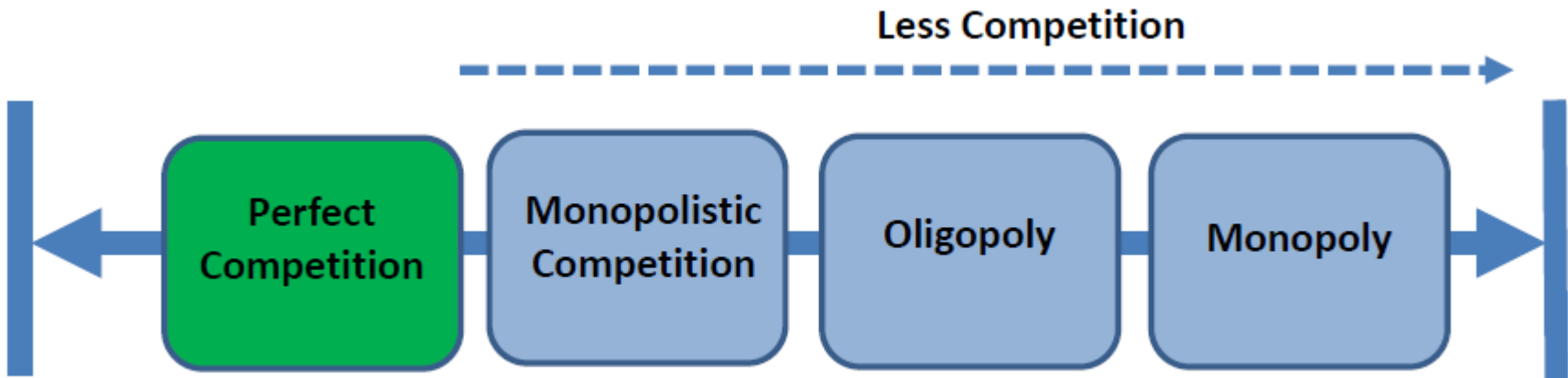 4. Freedom of entry and exit, existence of barriers to entry.

Underlying Assumptions

❑ There is a large number of consumers whose actions are uncoordinated.

❑ Objectives of all firms is to profit maximise.

2. Perfect Competition

Less Competition

| Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly

❑ Identifying characteristics:

  ➢ Large number of firms, output of any firm is small relative to market output (i.e. Each firm is a price taker and does not influence price).

  ➢ Market product is homogenous.

  ➢ Perfect information: Consumers are aware of market prices and firms know what competitors are doing.

❑ Examples: Certain raw materials and agricultural goods, the stock exchange.

The perfectly competitive market

❑ The fact that firm is a price taker has import implications for the shape of the demand curve the firm faces.

❑ Apples on Moore street are 25c each.

➢ At the market level, price is determined as normal (intersection of demand and supply)

➢ Individual seller faces horizontal demand curve; can sell as much as like at 25c, will neither increase nor reduce price.
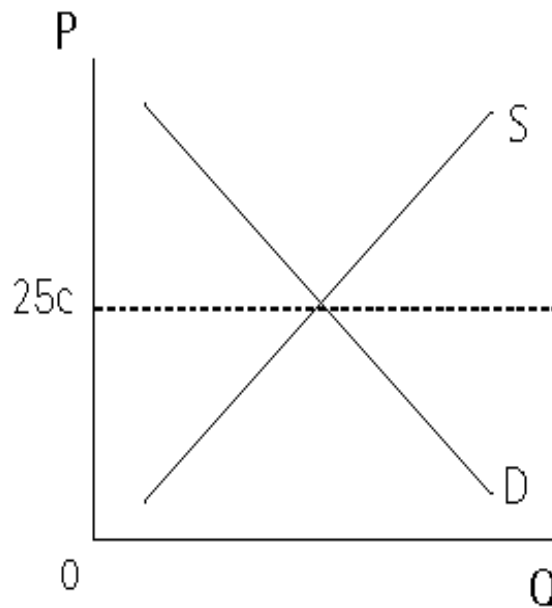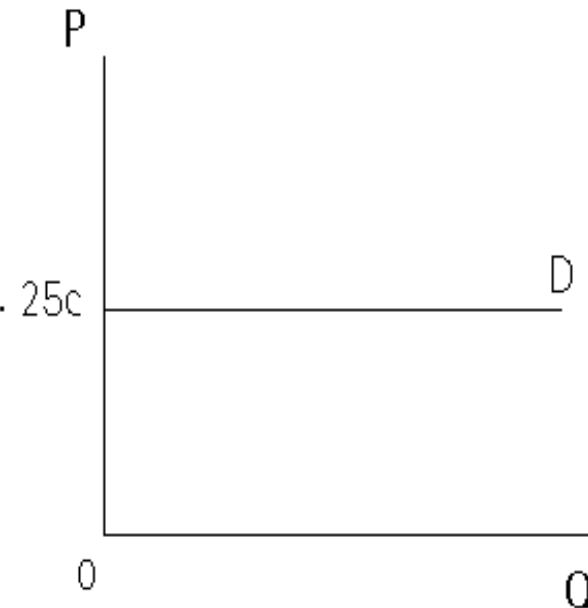
(a) Perfectly competitive market   (b) Perfectly competitive firm

- In a perfectly competitive market marginal revenue (MR) is equal to price (P) and average revenue (AR).
- Example: Firm does not have to lower price to sell more.

Qty	Price	TR	MR	AR
0	10	-	-	-
1	10	10	10	10
2	10	20	10	10
3	10	30	10	10
4	10	40	10	10

Output Decision in the Short-run

❑ 1st Output Condition: Profit-maximising firm will produce/sell where MR = SMC at Q*.

❑ With perfect competition MR = SMC = P at Q*.

❑ 1st Output Condition is a necessary but not sufficient condition for producing at profit maximising level.
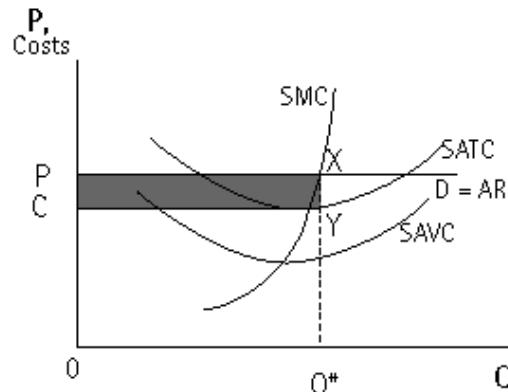
P, Costs

SMC

P ——————————×——— D = AR = MR

0   Q*   Q
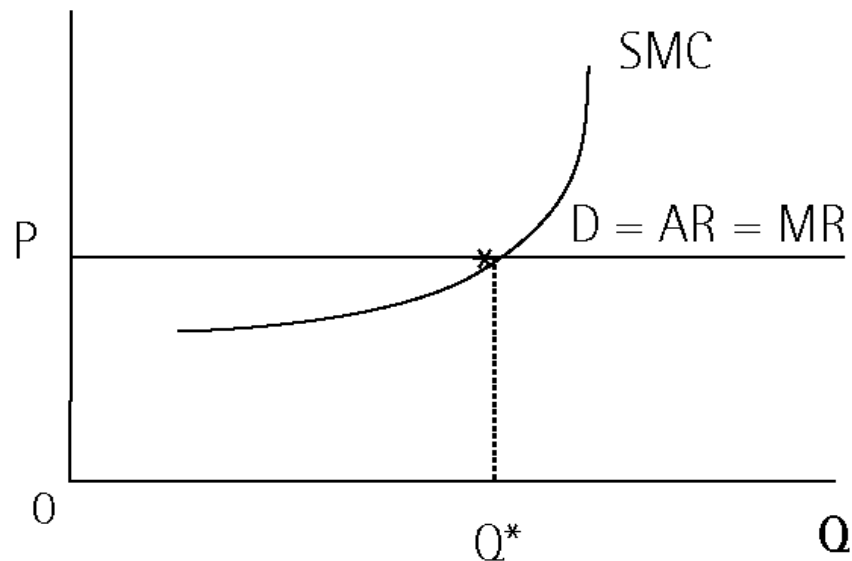
Four scenarios for a perfectly competitive firm

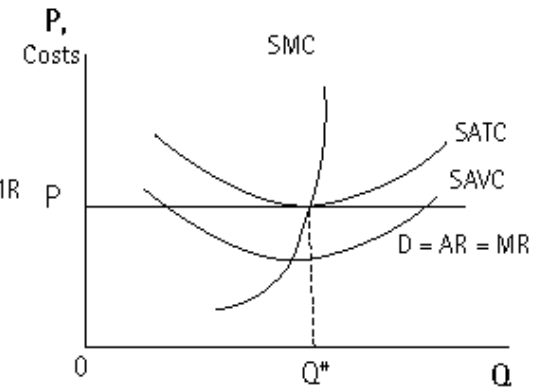❑ 2nd Output Condition: Firm must cover total costs (P≥SATC).

❑ (a) Since the AR curve is above the SATC, at the profit maximising level of production, the firm is making a supernormal profit.
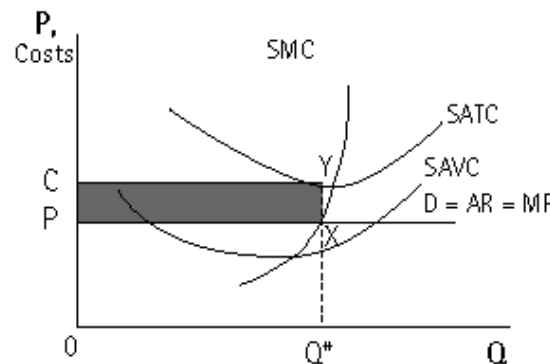
➢ |XY| is supernormal profit per unit.

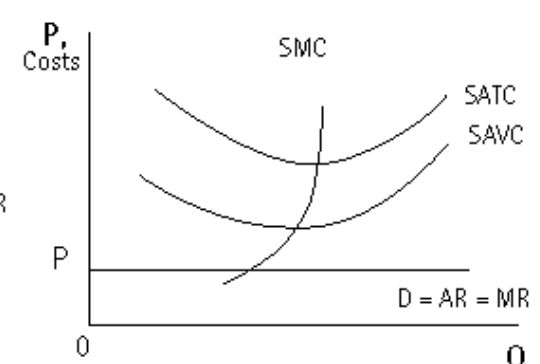➢ Super normal profit is |XY|Q* or [PXQ*0] – [CYQ*0] = [PXYC]

(a) Produce at a supernormal profit

(b) Produce at a normal profit

(c) Produce at a loss

(d) Shutdown

Aside: Deriving the short run supply curve in PC

❑ Assume a fixed SATC and SAVC in the short run.

❑ Start at P_0, firm will produce Q_0 (at point X) as both conditions are met at this point.

❑ If demand shifts inwards for whatever reason to D_1, firm will now produce Q_1 (at point Y) even though normal profits are not being achieved.

❑ If demand shifts inwards to D_2, the firm will produce Q_2 (at point Z), but if demand (i.e. The price) falls any further, the firm will shut down and stop supplying.

❑ Conclusion: Under PC, the firm's supply curve in the short-run is its marginal cost curve above the shutdown price. [Market supply curve is horizontal sum of firm supply curves]
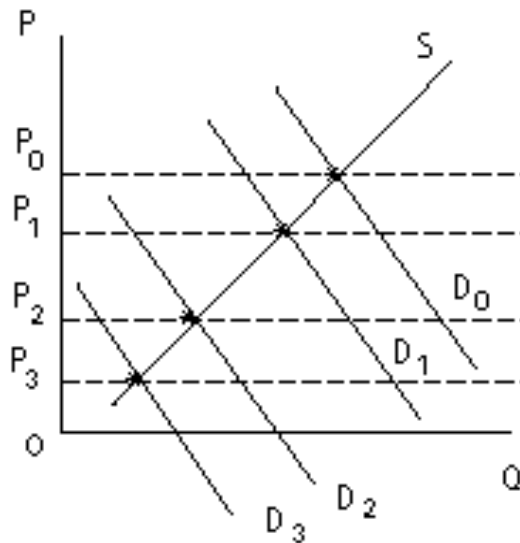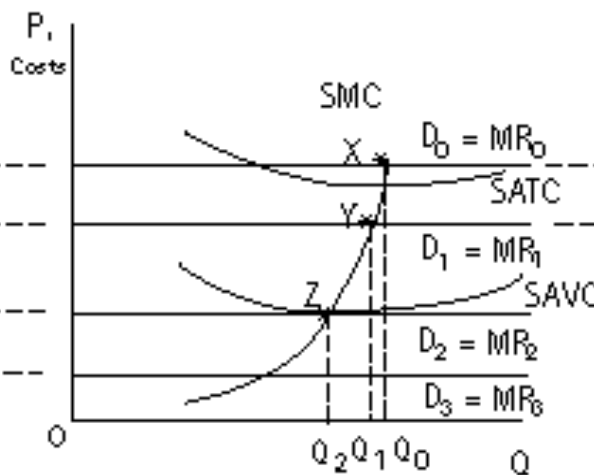
(a) The market　　　　(b) The firm　　　　(c) The supply curve

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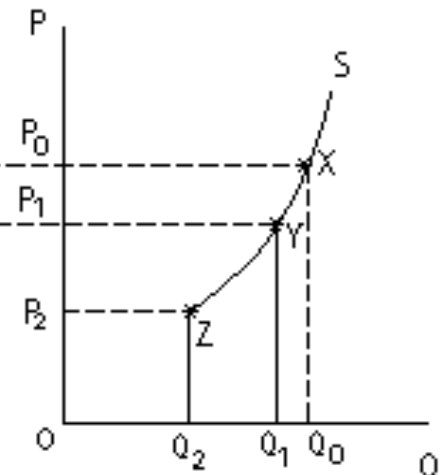
The long-run position following short-run losses

❑ In long-run, firms are free to enter and exit the market.

❑ We study two cases:

➢ The long run following short-run losses.

➢ The long-run following short run supernormal profits.

❑ Case 1: In a PC market in the long-run, firms making losses will exit the market.

➢ The supply curve shifts up to the left and price rises, and continues to rise until equilibrium is attained.

➢ The AR curve shifts upwards until it reaches tangency with the LAC.

➢ In the long-run, remaining firms will earn only a normal profit.

➢ Of course alternative approach would be to reduce costs.

(a) The market   (b) The firm

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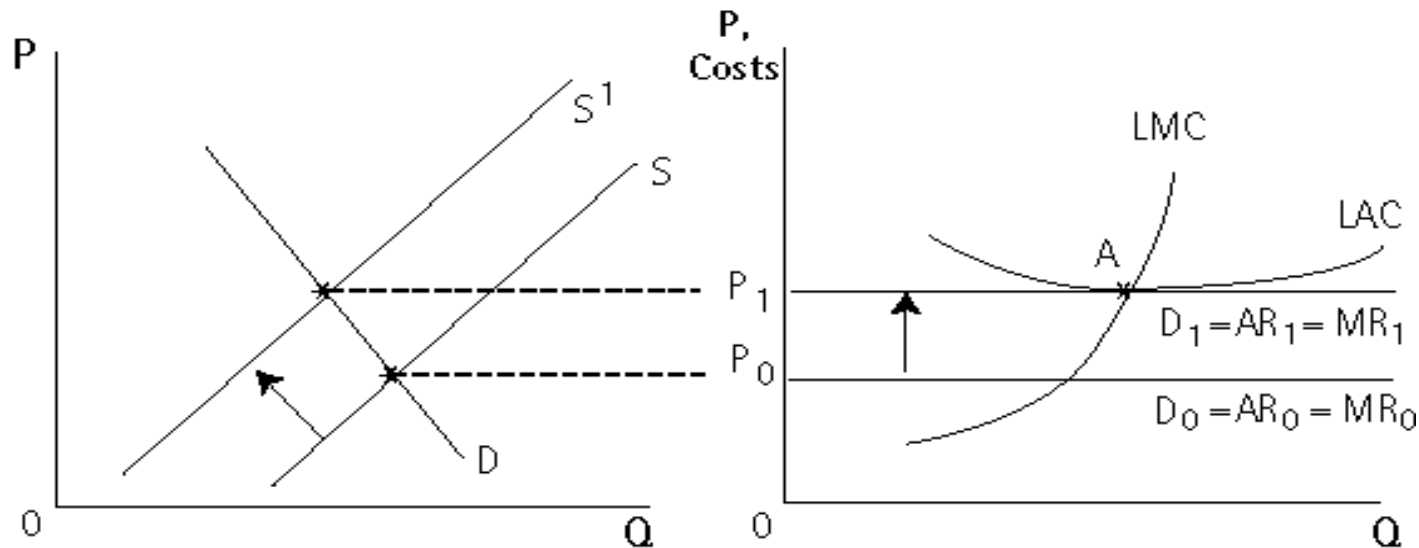
The long-run position following short-run profits

❑ Case 2: In a PC market in the long-run, if firms making supernormal profits, new firms will enter the market.

➢ Supernormal profits will be made at P_0.

➢ As firms enter the market, supply shifts outwards to S_1 and price will fall.

➢ Prices will be 'competed away' until equilibrium is reached and only normal profits are made.

(a) The market

(b) The firm
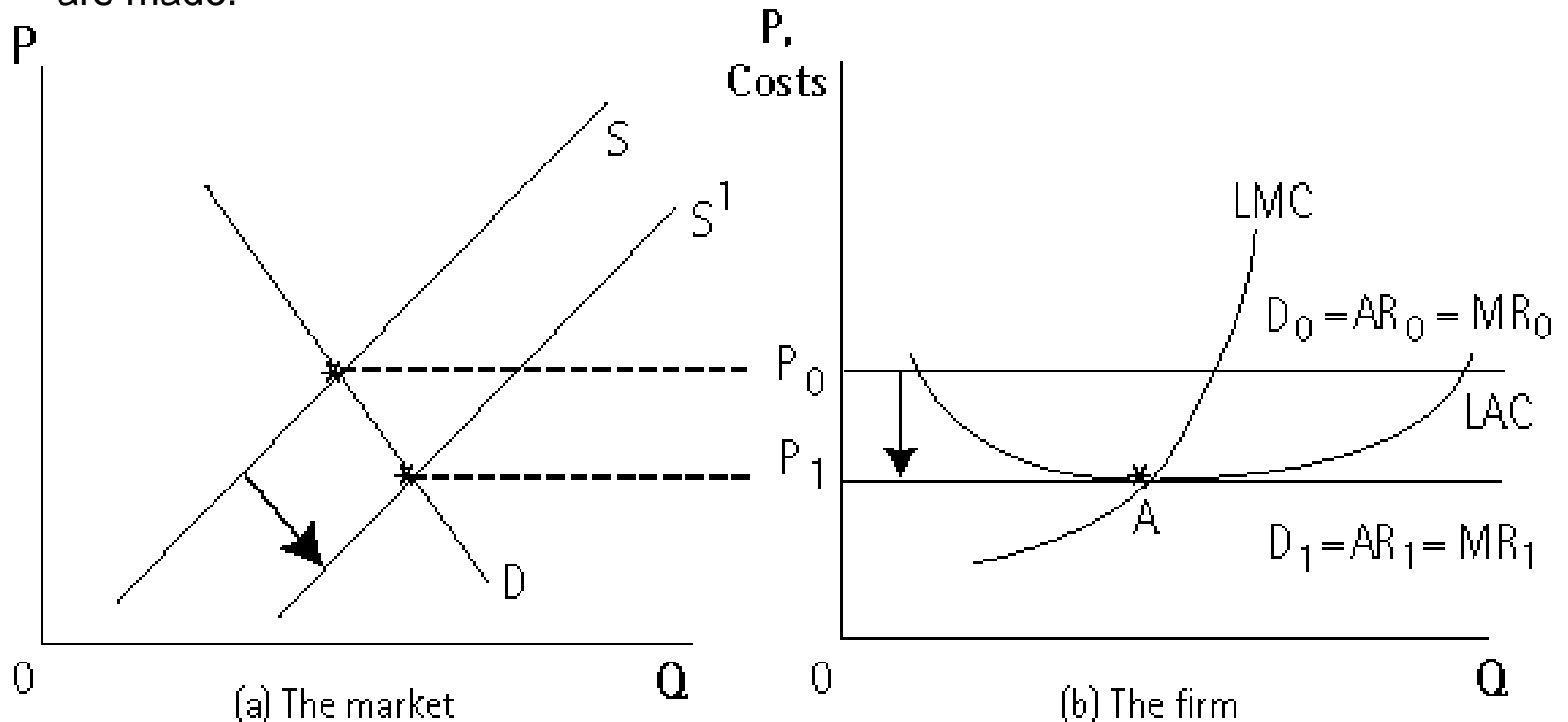
Perfectly competitive markets and efficiency

❑ Diagram shows the long-run equilibrium in a perfectly competitive market

❑ Supply curve = aggregation of marginal cost curves of all individual firms.

❑ Q** is not efficient nor socially optimal as customers are willing to pay the marginal cost for an additional unit. Both consumers and producers will be better off until Q*.

❑ At Q*:

➢ Firm is making optimal use of resources since it is producing at least possible cost per unit of output. Firm is producing in most efficient manner.

➢ Consumer not will in pay more for additional unit.

➢ Socially optimal, pareto efficient outcome.

3. Monopoly

Less Competition
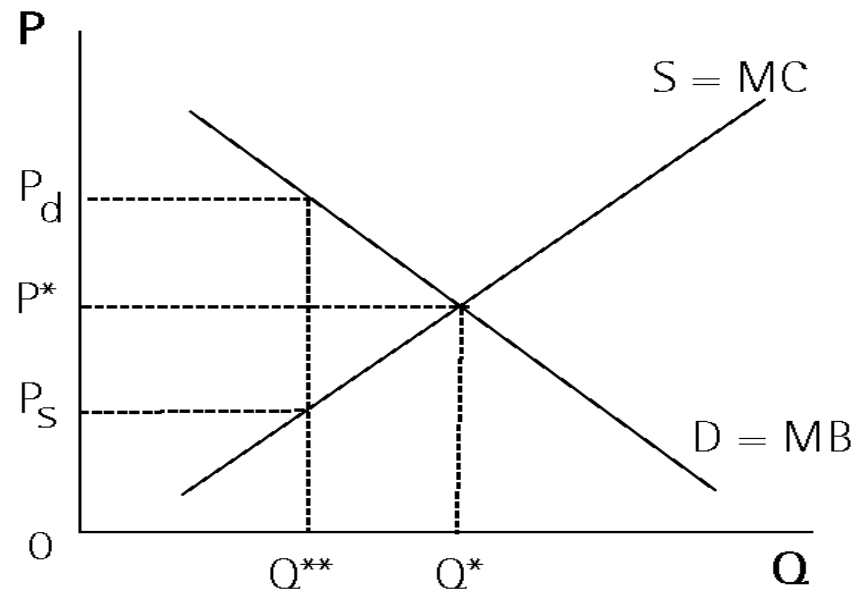
| Perfect Competition | Monopolistic Competition | Oligopoly | **Monopoly** |
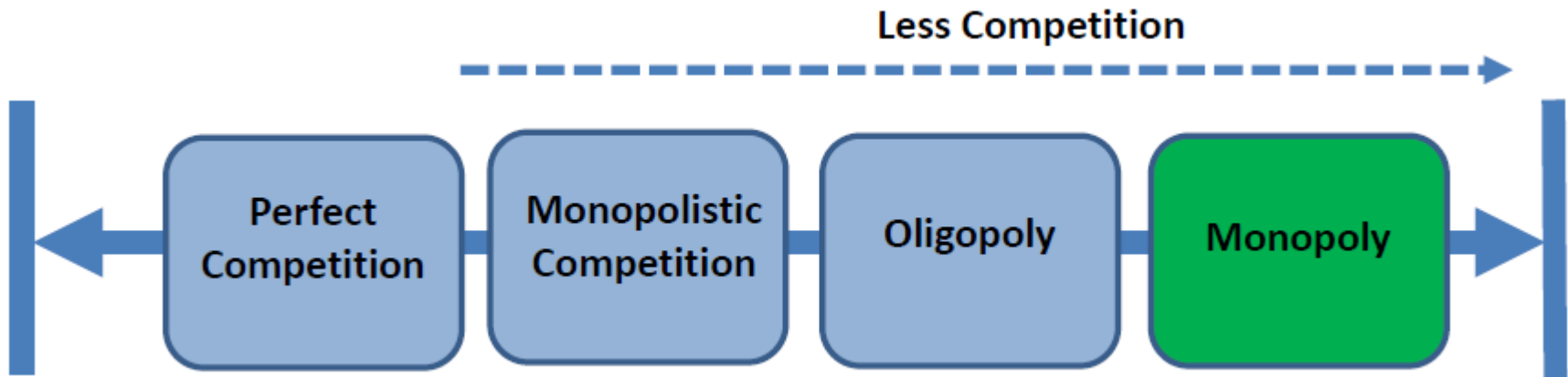
Forms of Monopoly

❑ Natural monopoly (economies of scale)

➢ utility companies, e.g. electricity (transmission), natural gas, cable or rail network, household waste collection

❑ Statutory monopoly

➢ a patent; e.g. a new drug

➢ sole ownership of a resource; e.g. a toll bridge

❑ Artificial monopoly, e.g. explicit formation of a cartel, e.g. OPEC

Monopoly Characteristics

1. Only one firm (seller) in the market.
2. A unique product is sold.
3. Barriers to entry exist which preclude the possibility of new firms entering the market even if monopolist is making supernormal profits.
4. Two types: Single priced and price discriminating monopolist

❑ Discussion: Examples of monopolies

Barriers to Entry 1

Type	Description	Low barrier	High barrier
Type of asset	Specific assets have more value in their current use than in the next best alternative. General assets can be shifted to alternative activities.	general	specific
Excess capacity	Incumbents are able to produce more output at an equal or lower price. Can be caused by cyclical demand or adopted as a strategy to deter new entrants.	insignificant excess capacity	substantial excess capacity
Reputational effects	Based on history of retaliation against new entrants and/or the resources available to incumbents to retaliate.	no retaliation anticipated	retaliation expected
Precommitment contracts	Long term contracts: with suppliers to purchase input at favourable rates; with distributors to give the product a favourable location; and with consumers to provide and maintain their product.	none or few	extensive
Pioneering brand advantage	Consumer loyalty given to first entrant into market.	quality of product can be judged prior to purchase	product must be purchased before testing
Cost of entry	Set-up costs required for a firm to enter a market.	low	high

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Barriers to Entry 2

| Type	Description	Low barrier	High barrier
Economies of scale	Minimum viable scale is the minimum amount of output required to produce a product at a cost that is very close to the competitors' cost per unit.	MVS at low % of industry output	MVS at high % of industry output
Government regulations	Licensing agreements are required before a firm can enter some markets. Patents legally restrict firms from copying an innovation for 17 years. Other regulations are designed to ensure product quality and/or consumer safety.	unregulated	regulated
Learning curve effects	Incumbents operating in a market benefit from knowledge which allows them to produce at a lower cost per unit.	small cost advantage	large cost advantage
Cost of exit	Exit barriers are factors that keep firms competing in a market. Sources of barriers include labour agreements, government intervention and emotional attachment to a market, location or employees.	low	high

Single Priced: Monopoly equilibrium

❑ Single priced monopolist: All the monopoly's customers are charged the same price.

❑ Since the monopolist is the only firm in market, the demand curve it faces is the market demand curve.

❑ As the demand curve is downward sloping, MR is less than price.

❑ Example in table:

➢ At P = €8, the monopolist sells two units, collecting total revenues of €16. Total revenue increases to €21 when €7 is charged. MR fell to €5 as to sell 3 units the price of all units sold had to be reduced.

➢ MR is always less than price when demand curve is downward slowing.

| Qty	Price	TR	MR	AR
0	10	-	-	-
1	9	9	9	9
2	8	16	7	8
3	7	21	5	7
4	6	24	3	6

SPM: Short-run equilibrium

❑ 1st condition (marginal) is met at output level Qm.

❑ 2nd condition (P>SATC)

❑ |XY| is supernormal profit per unit (difference between price and SATC)

❑ Total profit is [PmXYC]

❑ Supernormal profits can be sustained in the long-run for the monopolist. [Less distinction between short and long run]

❑ However, no guarantee that monopolist will earn supernormal profits.
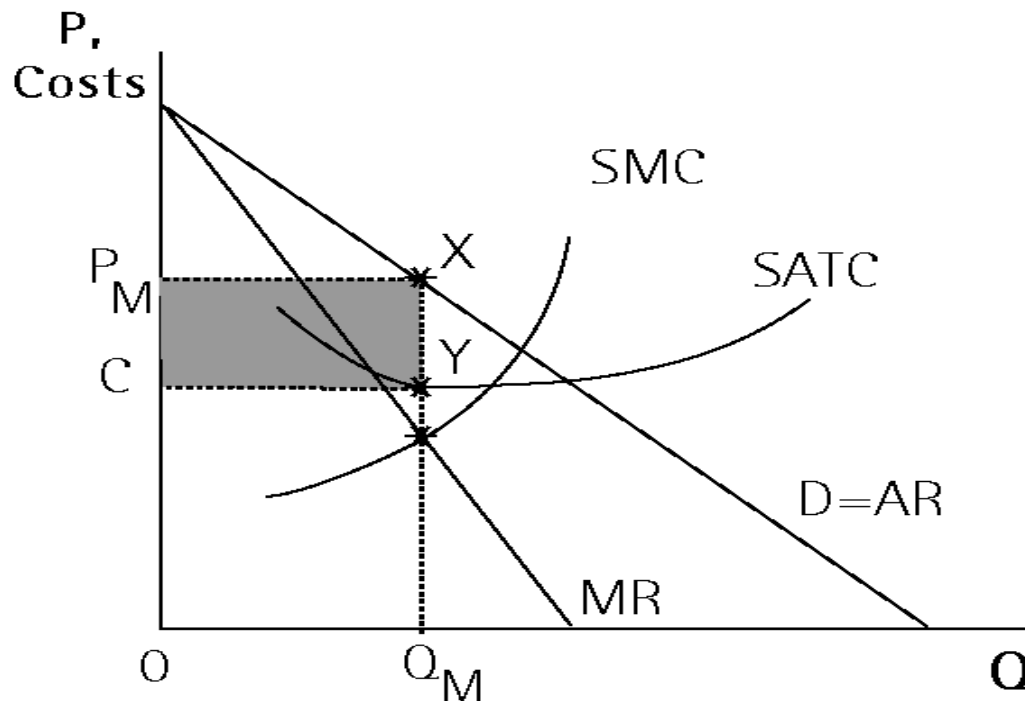
Monopolist earning a normal profit; sustaining a loss

❑ However, no guarantee that monopolist will earn supernormal profits.

❑ For a given level of demand, it depends on the structure of costs.

❑ Or maybe price is kept artificially low by a regulator.

❑ (a) at Qm the average revenue curve is tangent to the average total cost curve and so a normal profit is achieved.

❑ (b) Monopolist will produce at a loss as price is greater than SAVC but lower than SATC. We expect monopolist to exit market if not making a normal profit in the long-run, unless state subsidised.
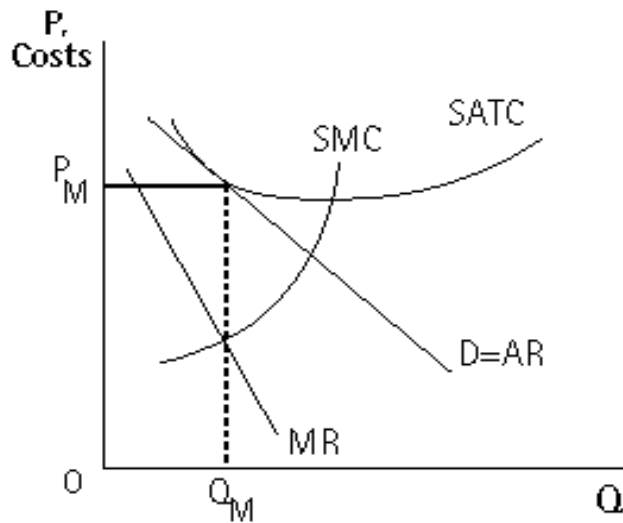
(a) Monopolist earning a normal profit
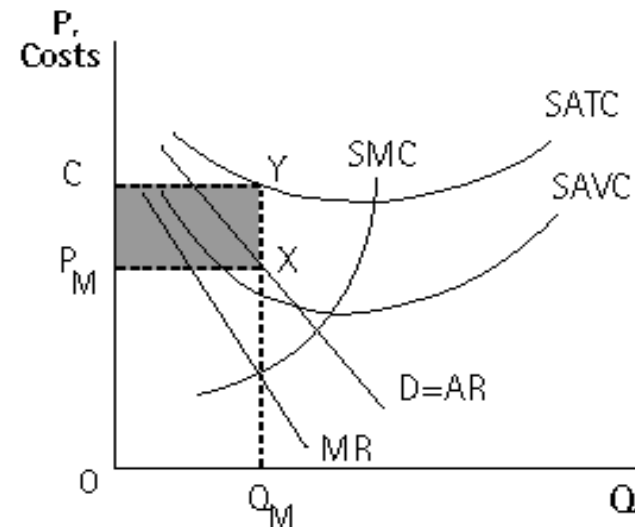
(b) Monopolist sustaining a loss

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Price Discrimination

❑ Price discrimination occurs when a firm charges different prices to different consumers for the same product for reasons other than differences in costs.

❑ Price discriminating monopolist earns more profit than a single priced monopolist.

❑ Two conditions:
  ➢ Separate markets featuring demand curves with different price elasticities must be identified. Separate markets by classification of customer, geography or time.
  ➢ The markets must be separated so that the products can not be resold.

❑ First degree price discrimination occurs when every consumer is charged the maximum price that he/she is willing to pay.

❑ Third degree price discrimination occurs when a firm separates consumers into a small number of classes and establishes a different price for each class.

❑ Discussion: Any examples?

Price Discriminating Monopolist

❑ Only difference from single priced monopolist example is that the producer does not have to cut price on previous units sold.

❑ MR per unit sold is higher in this case. TR is also higher.

❑ The demand curve, price and marginal revenue are the same in this case.

| Qty	Price	TR	MR
0	10	-	-
1	9	9	9
2	8	17	8
3	7	24	7
4	6	30	6

Profit-maximising levels of output for the single-price monopolist and the price discriminating monopolist

❑ Single price monopolist will produce at Q_1
❑ First degree price discriminating monopolist will produce at Q_2
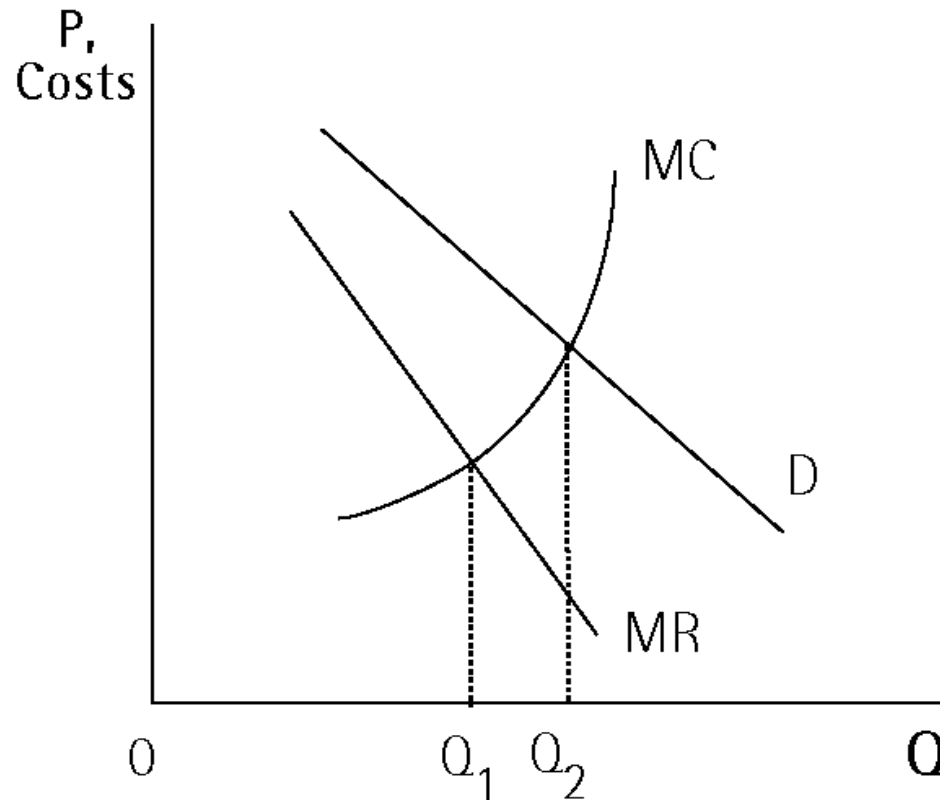
Perfect competition and single price monopoly compared

❑ Compare equilibrium positions

❑ To do this, join (hypothetically) all firms in perfectly competitive market together to hypothetically create one firm.

❑ Long-run PC: MR = MC = AC = AR ⟹ Q_2 produced at price P_2.

❑ Long-run SPM: MR = MC ⟹ Q_1 produced at P_1.

❑ SPM is producing less and charging a higher price, this can persist in long-run.
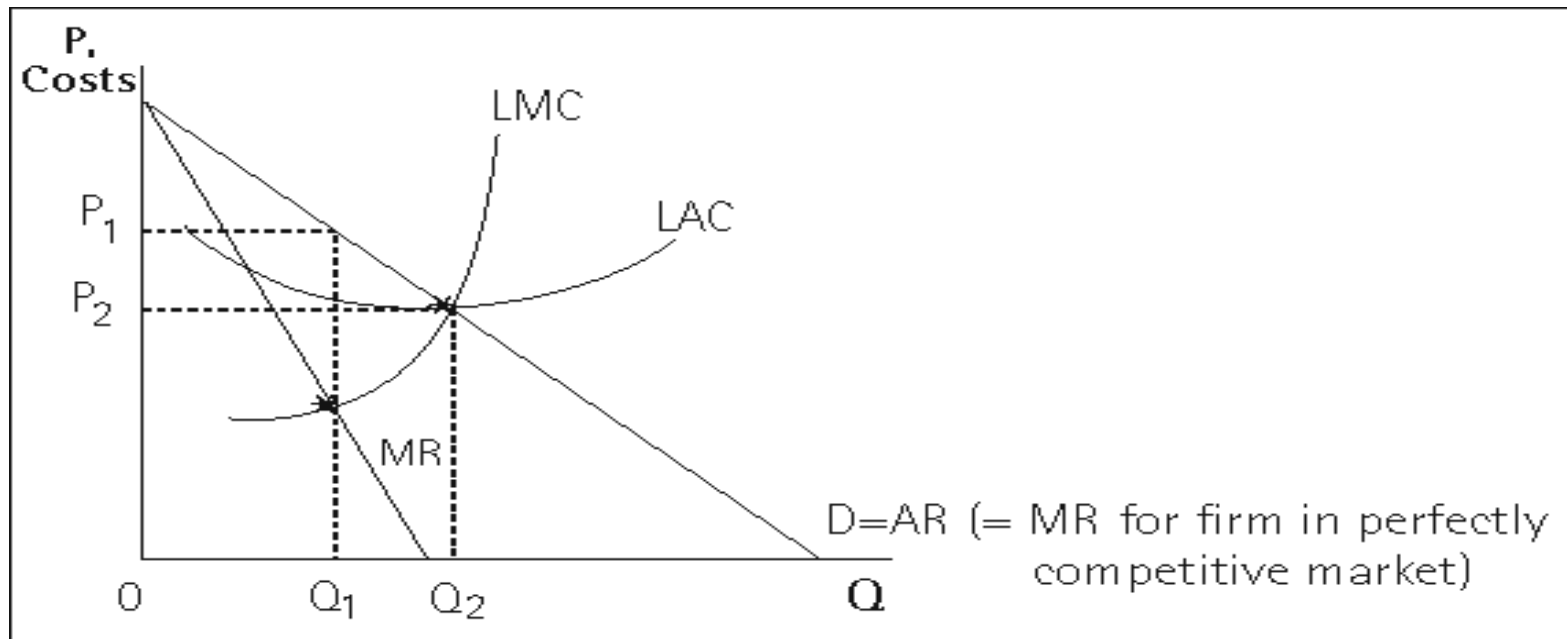
Monopoly equilibrium and efficiency

❑ Single priced monopolist

❑ At market equilibrium, the additional cost of producing an extra unit of output (MC_1) is less than what consumers are willing to pay for an extra unit (P_1) .

❑ Increasing production beyond Q_1 adds more to consumer welfare than to producers cost.

❑ Area BCE is the net gain to society from increasing output from the monopoly level that would occur in a perfectly competitive market. But what about distributional effects?
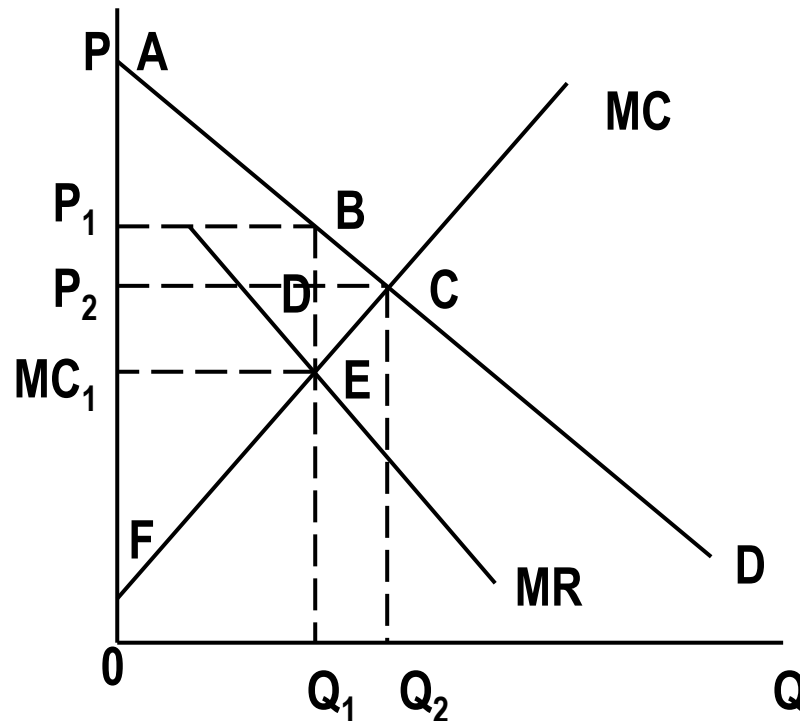
Consumer Surplus in Action

❑ Consumer surplus is the amount a buyer is willing to pay for a product minus the amount the buyer actually pays.

❑ Consumer surplus is the area below the demand curve and above the market price.

> ➢ A lower market price will increase consumer surplus (<u>provided that the product is still supplied, of course</u>).
>
> ➢ A higher market price will reduce consumer surplus.

Producer Surplus in Action

❑ Producer surplus is the amount a seller is paid for a product minus the total variable cost of production.

➢ A higher market price will increase producer surplus (<u>provided that the product is still demanded, of course</u>).
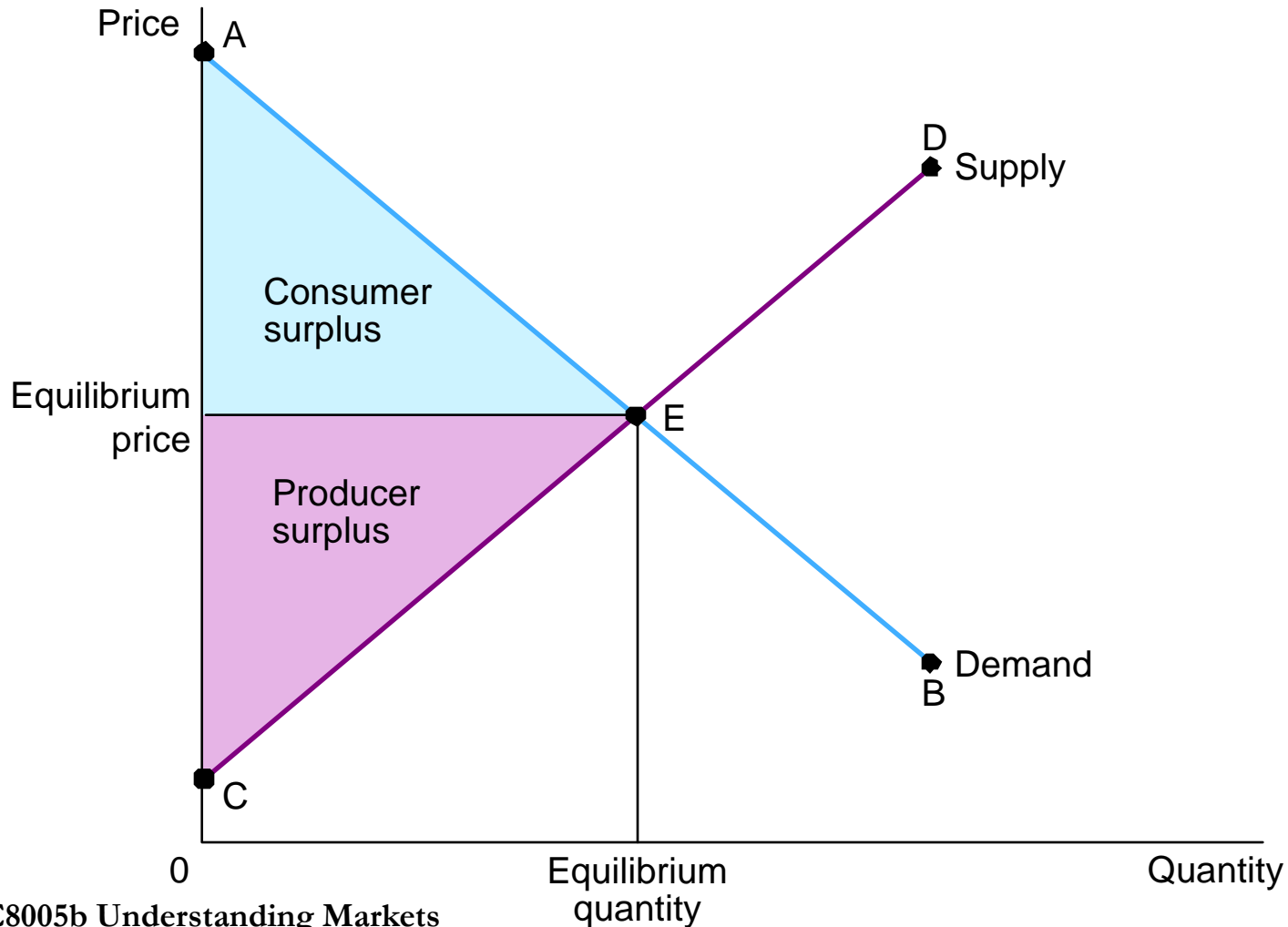
➢ A lower market price will decrease producer surplus.

Economic Welfare

❑Economic welfare is (generally) quantified as the sum of consumer surplus and producer surplus, i.e. equal weights are generally assumed.
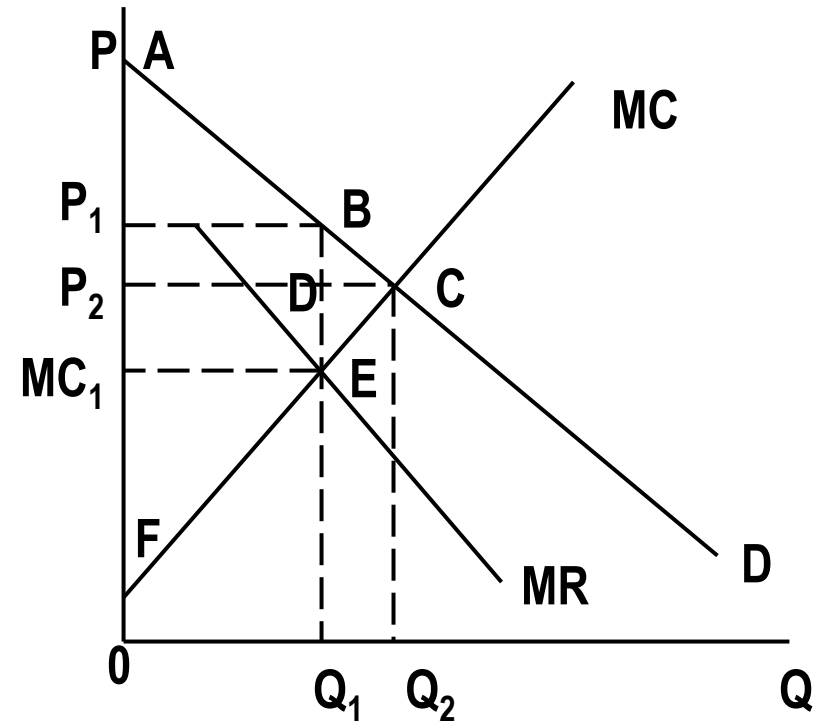
❑Alternative relative weights are also possible.

Consumer Surplus and Producer Surplus: Market Equilibrium


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Monopoly equilibrium and efficiency

- ❑ Distributional Effects
- ❑ Consumer surplus: amount consumers willing to pay over and above what consumers actually have to pay.
  - ➢ PC: Triangle ACP_2
  - ➢ SPM = ABP_1
  - ➢ Part of loss goes to monopolist P_1BDP_2
  - ➢ Rest is a loss to both (society) of BCD.
- ❑ Producer surplus: Amount that producers receive over and above the minimum amount necessary to keep them in the market.
  - ➢ PC: Triangle CFP_2
  - ➢ SPM: P_1BEF
  - ➢ DCE is lost PS not appropriated by consumers.
- ❑ Total loss to society is BCE (DCE + BCD).

4. Monopolistic Competition

Less Competition

Perfect Competition — Monopolistic Competition — Oligopoly — Monopoly
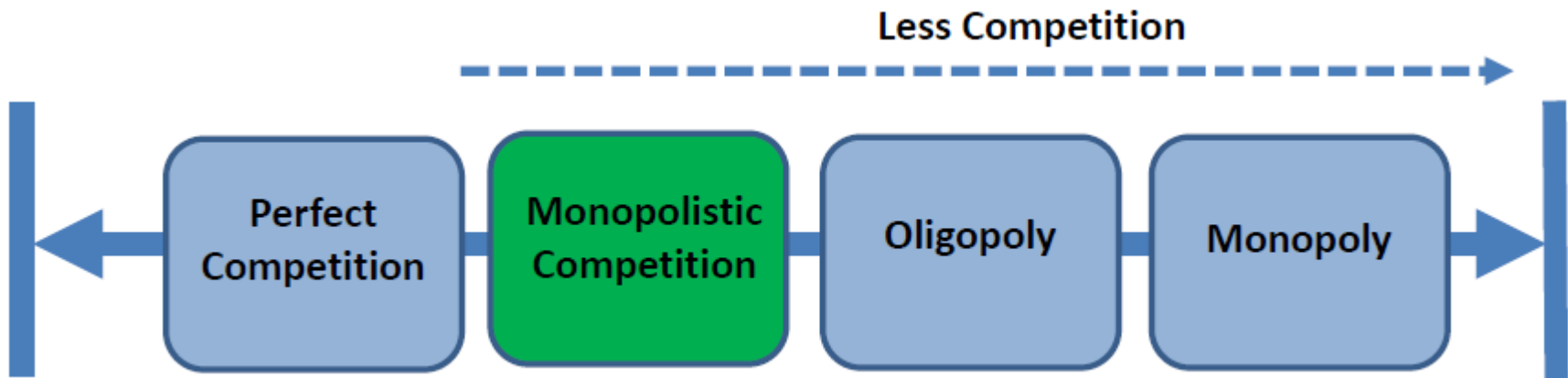
Monopolistic Competition

❑ Incorporates features of both PC and monopoly.

- ➤ Large number of firms
- ➤ Freedom to enter and exit
- ➤ But products are differenced. Close but nor perfect substitutes.

❑ Means that in short-run firms have some degree of market power (with own brands/products) resulting in the possibility of supernormal profits.

❑ Demand curve is downward sloping but more elastic (flatter) than that of a monopolist.

# A monopolistic competitor's short-run equilibrium

- ❑ 1st condition: Monopolistic Competitor will produce at Q_1 where MC = MR.
- ❑ In this case AR is greater than SATC so supernormal profits are earned.
- ❑ This wont last in the long-run.
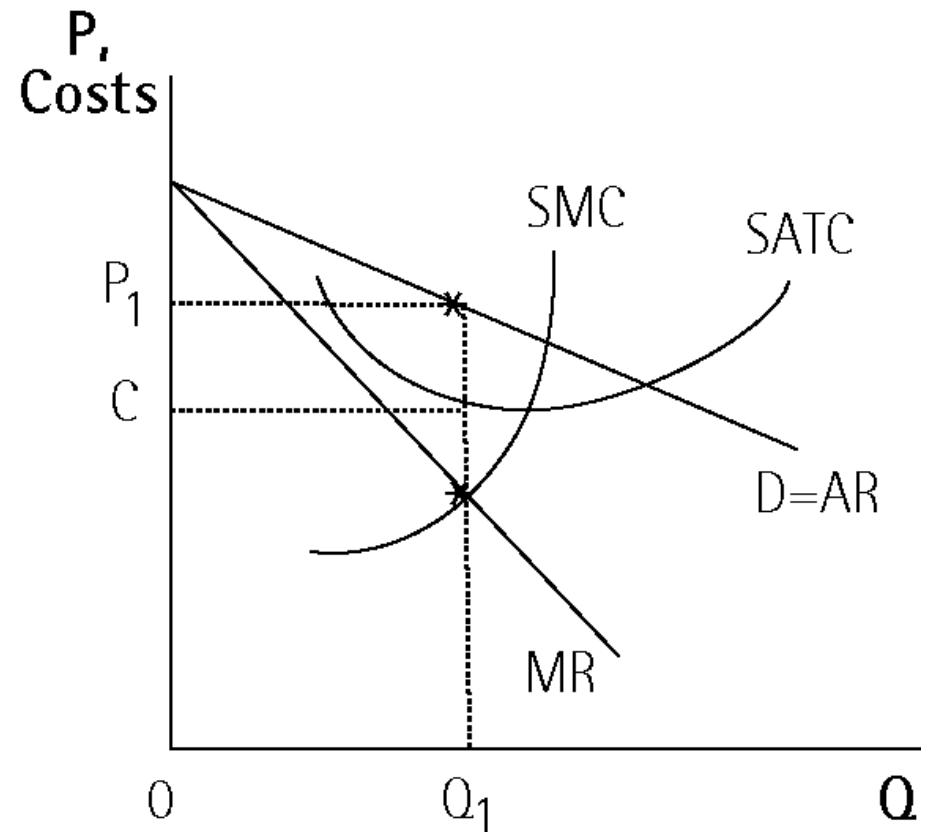
A monopolistic competitor's long-run equilibrium

❑ Because of free entry, new firms will be attracted into the market and produce very close substitutes.

❑ Market supply rises and prices fall. Demand for existing firm's product falls as its market share falls – demand curve becomes more elastic (flatter).

❑ Supernormal profits are 'competed away' until no further incentive for firms to enter market.

❑ Long-run equilibrium is achieved at point A (Q2), also where MR = MC and AR = LAC.

❑ MC does not produce at the lowest point on its average cost curve. Not socially optimal.

❑ Additional costs like advertising and branding part explain these inefficiencies.

❑ But we do gain variety (innovation) at the expense of efficiency.

5. Oligopoly

Less Competition
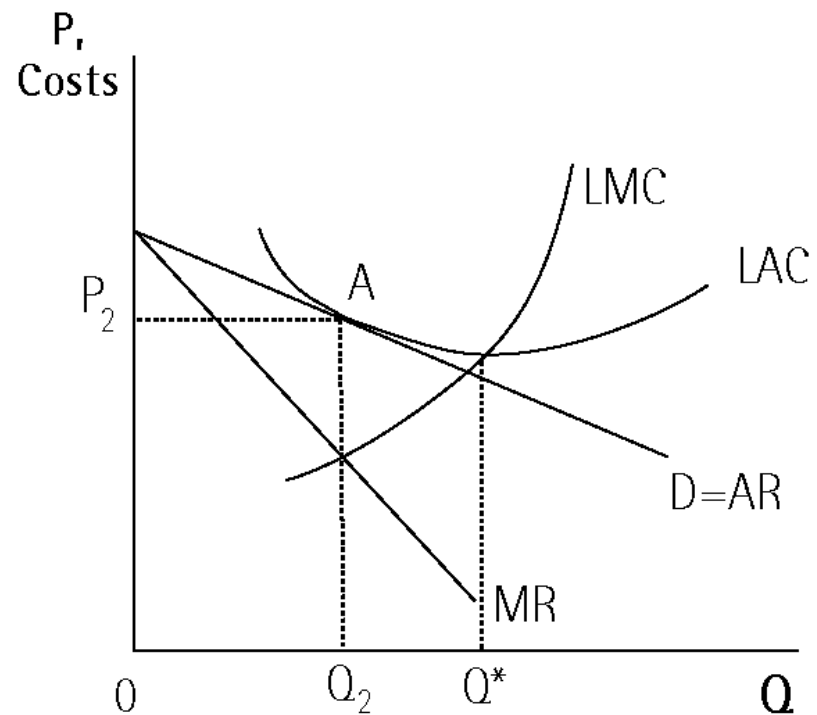
Perfect Competition — Monopolistic Competition — Oligopoly — Monopoly
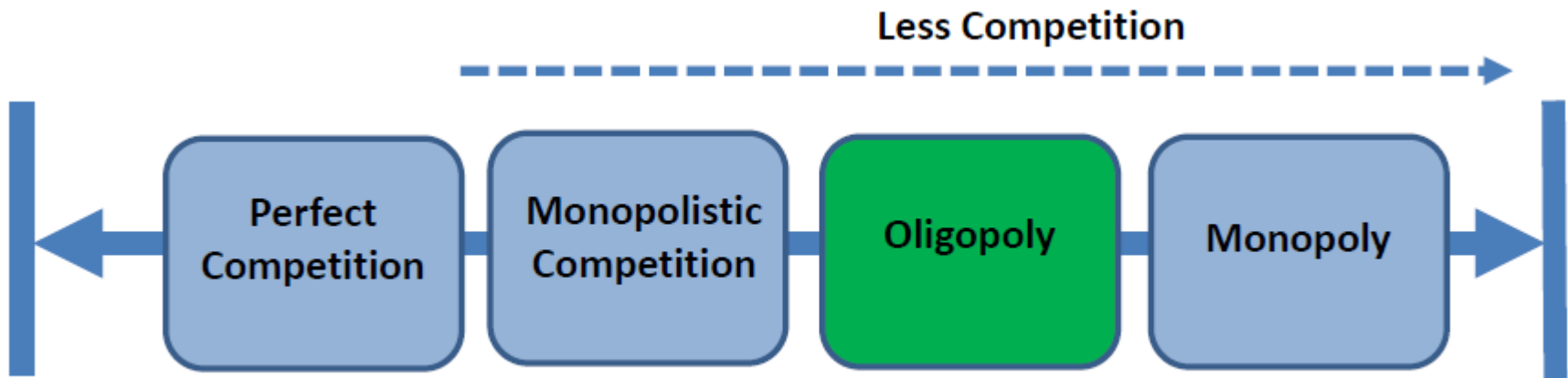
1. Assumptions

2. Collusive Oligopoly

3. Game Theory: Prisoners Dilemma

4. Advertising Game

5. Eating Out Game

Oligopoly: Assumptions

1. Many buyers
2. Small number of major sellers ($\Rightarrow$ interdependence: actions and reactions are very important)
3. Homogeneous product (usually, but not necessarily). Oil (identical) v's cars (differentiated).
4. Complete information (usually, but not necessarily)
5. Restricted entry (usually, but not necessarily)
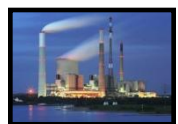
❑Under oligopoly, prices tend to be higher.

❑If there is full collusion, firms can act as a monopoly.

❑There is no single theory of oligopolistic behaviour.

Collusive oligopoly

❑ Act as a monopolist when firms get together and collude over price and output strategies.

❑ Equilibrium position is identical to monopoly model.

❑ Total market demand is shared out between firms through a quota (e.g. OPEC).

❑ A cartel is a group of firms who collude on price and output decisions in an effort to earn monopoly profits.

❑ Cartels are outlawed in most countries but difficult to police.

❑ Incentive to cheat if in a cartel.
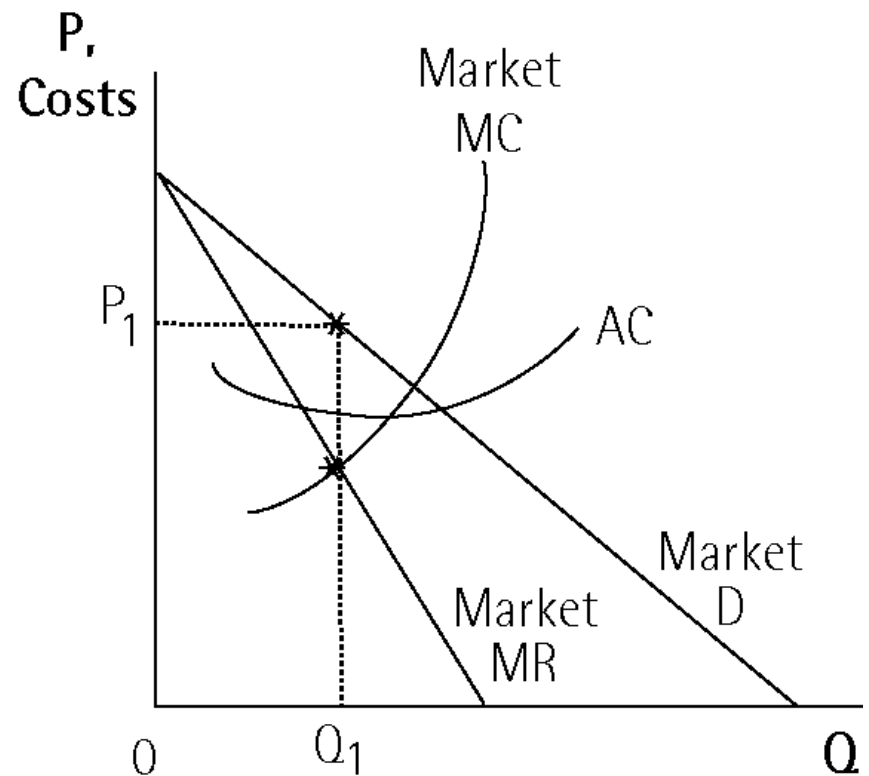
Oligopoly & Game Theory: Models

1. The unpredictable nature of colluding firms led to the focus on game theory to help understand oligopolistic behaviour.

2. Game theory has many applications.

3. A game consists of rules, players (decision makers), strategies (actions) and payoffs (scores).

4. Players try to maximise his/her own payoff.

Prisoners Dilemma

❑ Two suspected thieves are apprehended by the police.

❑ The Sergeant places the two suspects into different rooms.

❑ Told if both confess – joint sentence = 4 years.

❑ If neither confess – joint sentence = 1 year.

❑ If one confesses and the other does not – confessors sentence quashed, while accomplice will receive 8 years.

❑ Neither suspect knows what the others decision will be.

❑ Each suspect will take

Prisoners Dilemma Pay-offs

		Suspect 2	
		Confess	**Deny**
Suspect 1	**Confess**	4,4	0,8
	Deny	8,0	1,1

❑ Suspects will choose dominant strategies.

❑ Both suspects confess and hence the Nash equilibrium is {confess, confess}.

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Examples of Games: Advertising Game (≈ Prisoners' Dilemma)

		Firm j	
		Advertise	**Don't Advertise**
Firm i	**Advertise**	2,2	4,1
	Don't Advertise	1,4	3,3

Advertising Game

- Nash equilibrium = Advertise, Advertise = [2,2]

- [2,2] < [3,3] i.e. Nash equilibrium can be inefficient!

- Cooperation may evolve in repeated games.

Oligopoly: Collude or Cheat?

		Firm 2	
		Maintain high p	**Undercut**
Firm 1	**Maintain high P**	7,7	1,10
	Undercut	10,1	2,2

Summary

TABLE 6.10: THE CHARACTERISTIC DIFFERENCES BETWEEN MARKET STRUCTURES

	Perfect competition	Monopolistic competition	Oligopoly	Monopoly
No. of firms	Many	Many	Few	One
Type of product	Identical	Differentiated	Identical or differentiated	Unique
Barriers to entry	No	No	Yes/No	Yes
Pricing strategy	Price taker	Price maker	Interdependent	Price maker
Long-run profits	Normal	Normal	Possibility of Supernormal	Possibility of Supernormal
Examples	Agricultural markets Capital markets	Service stations Restaurants	Automobile fuel Cement	Rail-transport Airport management

Online Explanations
Khan Academy

- Oligopoly: https://www.youtube.com/watch?v=N0L00FZnhtg

- Prisoners Dilemma: https://www.youtube.com/watch?v=UkXI-zPcDIM

Questions?