
OLIGOPOLY

Market structure	No. of firms	Product differentiation	Barriers to entry	Market power	Degree of competition	Examples
Perfect competition	Large no. of small firms	Homogeneous products (identical, no brand names)	No barriers to entry	None	Perfect	Agriculture, silver and gold, stock and bond, foreign exchange market
Monopolistic competition	Large No. of small/ medium firms	Product differentiation	No barriers to entry	Some	A good amount	Shoe, clothing, computer, restaurant, novel
Oligopoly	Small no. of large firms	Differentiated or undifferentiated	High barriers to entry	Significant	Some	Coca-Cola & Pepsi, car industry, airlines Oil, steel, aluminum, copper
Monopoly	Single seller or dominant firm	Unique goods without close substitutes	High barriers to entry	Very significant	None	Electricity supply, water supply, train system in China. Microsoft operating system with windows

The characteristics of Oligopoly

1. **Small number of large firms** (from Greek word meaning “few sellers”)
2. **High barriers to entry**
   - Economies of scale (aircraft, car industry)
   - Legal barriers (Pharmaceutical industry)
   - Control of natural resources (oil, copper, silver)
   - Aggressive tactics
   - High starting up costs

3. **Interdependence**
   - Small number of firms makes the firms mutually interdependent. One firm’s decision will affect other firms in the industry.

Monopoly = 1 firm
Duopoly = 2 firms
Oligopoly = 2 or more firms

* There is no precise upper limit to the number of firms in an oligopoly, but the number must be LOW enough that the actions of one firm significantly influence the others.

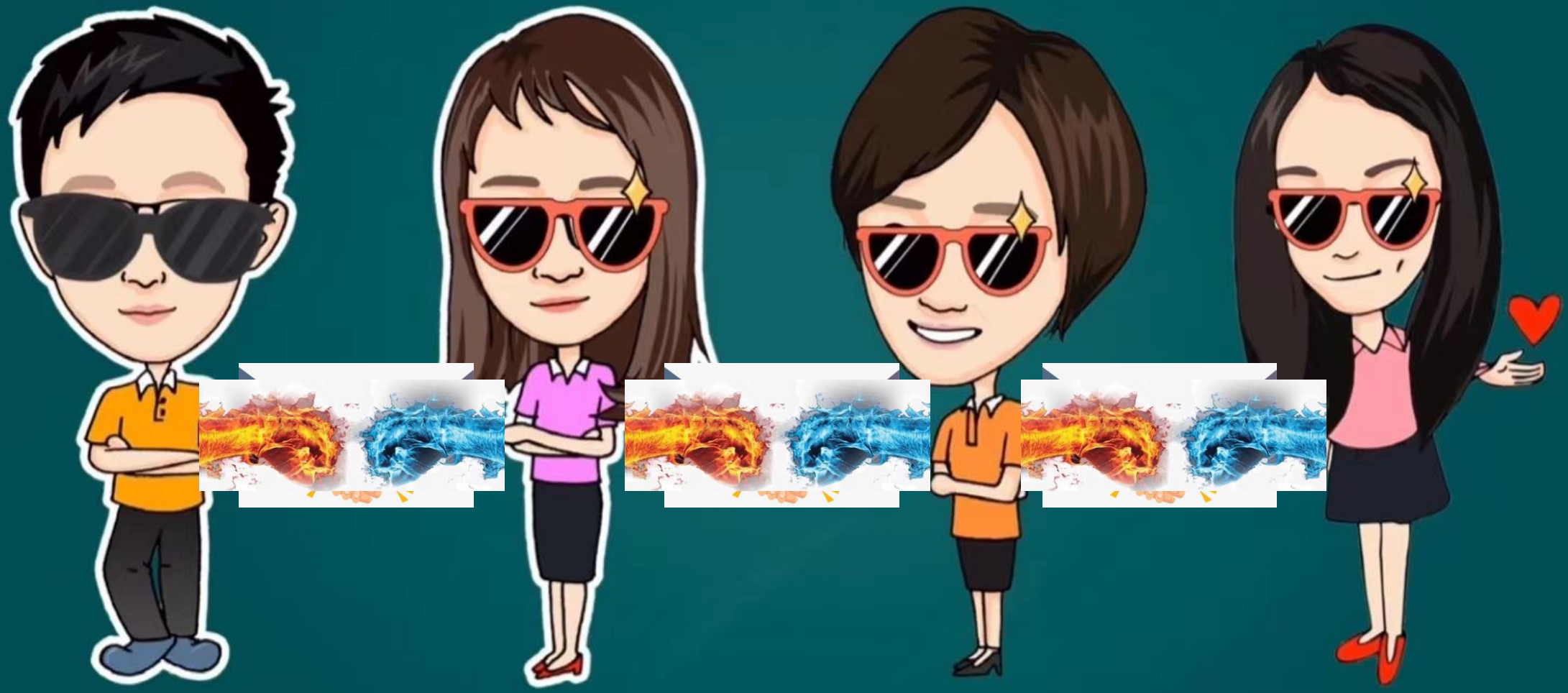
Oligopoly

Product types

✓**Homogeneous product**: oil, steel, aluminum, copper, etc.

✓ **Differentiated products**: cars, aircraft, cigarettes, etc.

Oligopoly



Interdependence

The interdependence nature of Oligopoly will lead to:

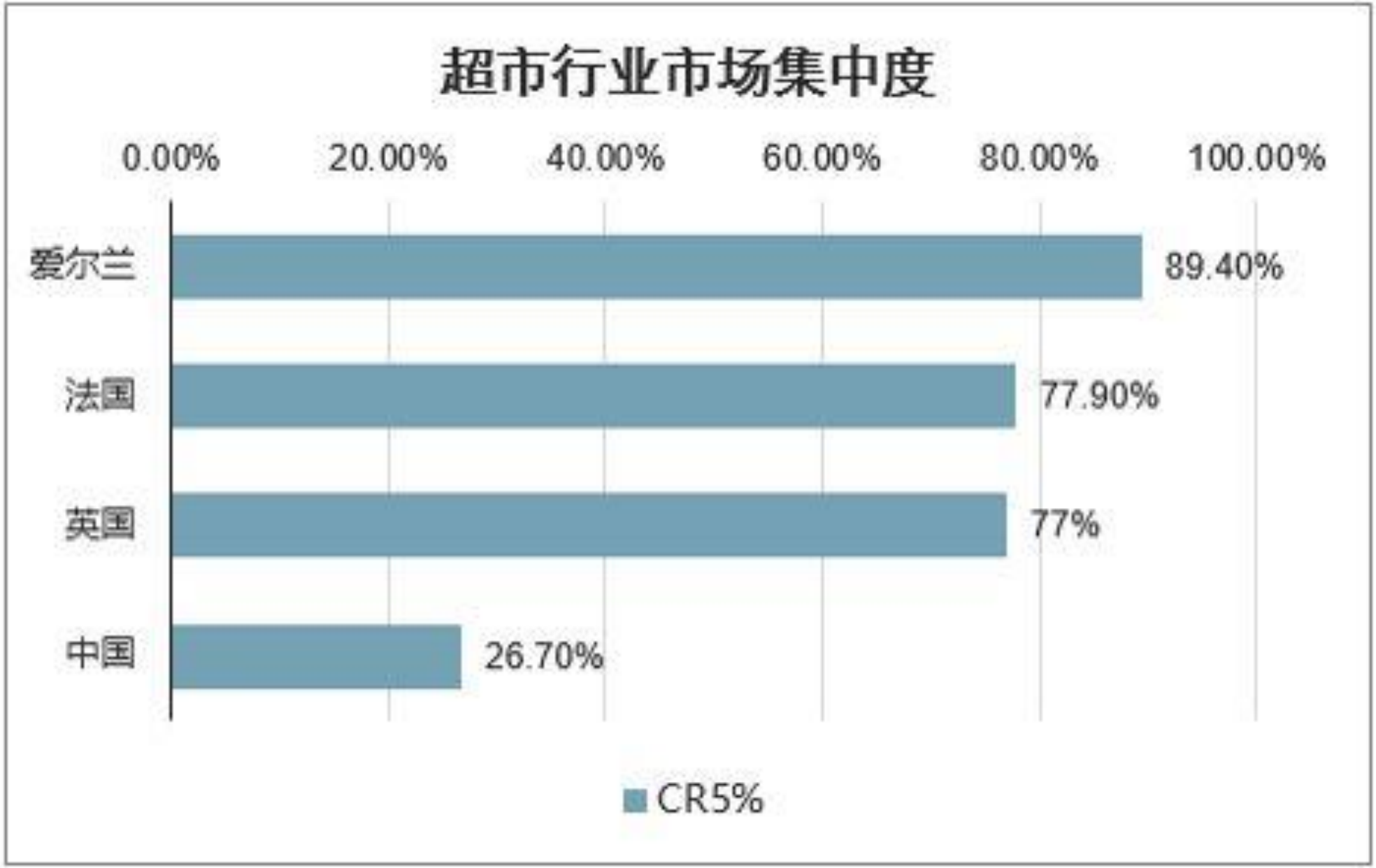
1. **Strategic behavior**: based on plans of action that take into account rivals' possible courses of action.
   - Firms planning their strategies make great efforts to guess the actions and reactions of their rivals in order to formulate their own strategy.
2. **Conflicting incentives**: firms in oligopoly face incentives that conflict, or clash with each other:
   - **Incentive to collude** (collusion: an agreement between firms to limit competition between them, usually by fixing price and therefore lowering quantity produced)
   - **Incentive to compete**, or to cheat in a collusive agreement.

The concentration ratio

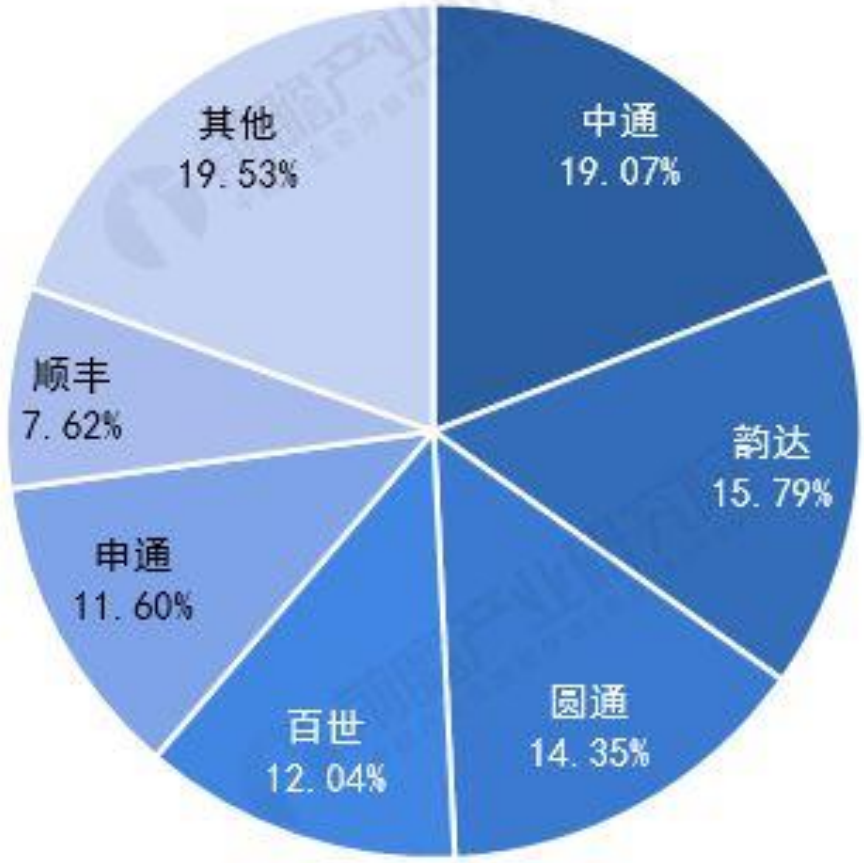
- A measure of how much an industry's production is concentrated among the industry's largest firms. It measures the **percentage of output produced** by the largest firms in an industry, and it used to provide an indication of the **degree of competition** or **degree of market power** in an industry.
- The **higher** the ratio, the **greater** the degree of market power, the **lower** the degree of competition.

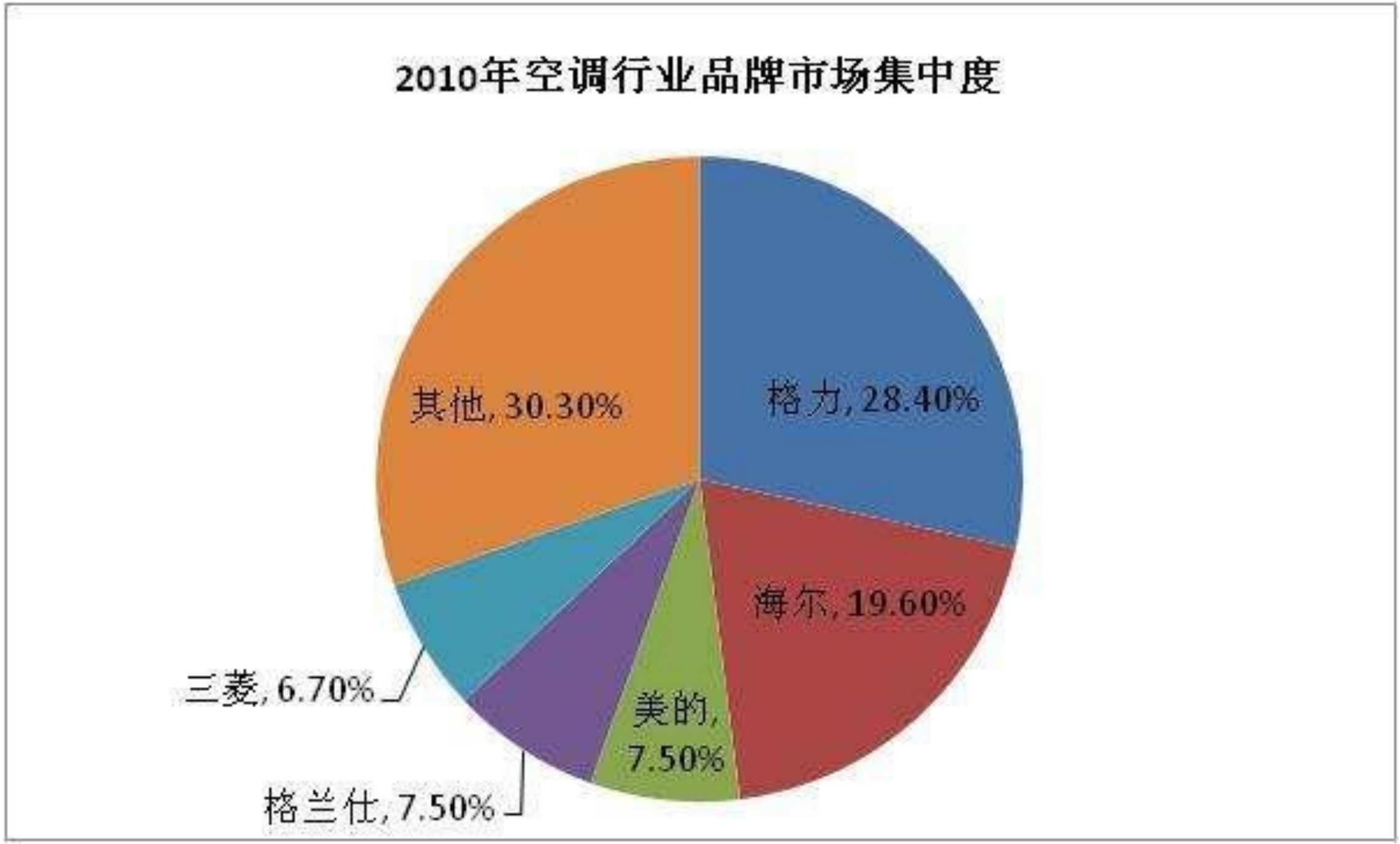
The concentration ratio

- **Four-firm concentration ratio**
  - The four-firm concentration ratio is determined by **adding up the percentage market share of each of the top four firms in the industry**.
  - The higher percentage of the market controlled by these four firms, the less competitive the market is.
  - Industry is considered to be oligopolistic if the four largest firms control **40%** of the output. (arbitrary cut-off point)
- **Eight-firm concentration ratio**
- **Herfindahl-Hirschman Index, HHI**
  - It is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers. It can range from close to zero to 10,000.
  - if there are 1000 firms in the market, and the market shares of each firms are 0.1% HHI is: $0.1^2 * 1000 = 10$
  - For pure monopoly with 100% market share, HHI is $100^2 = 10000$

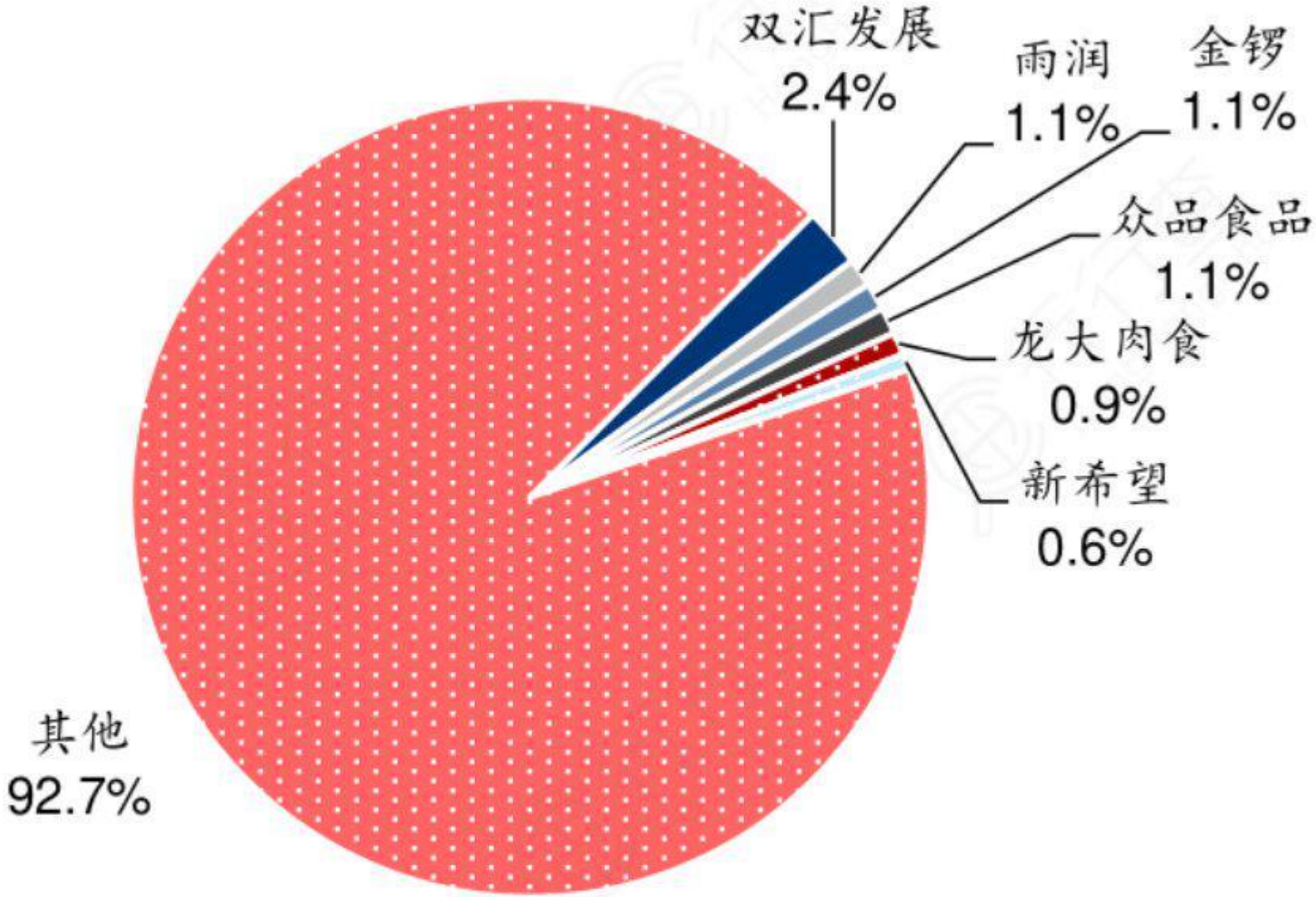

超市行业市场集中度
0.00%
20.00%
40.00%
60.00%
80.00%
100.00%
爱尔兰
89.40%
法国
77.90%
英国
77%
中国
26.70%
CR5%

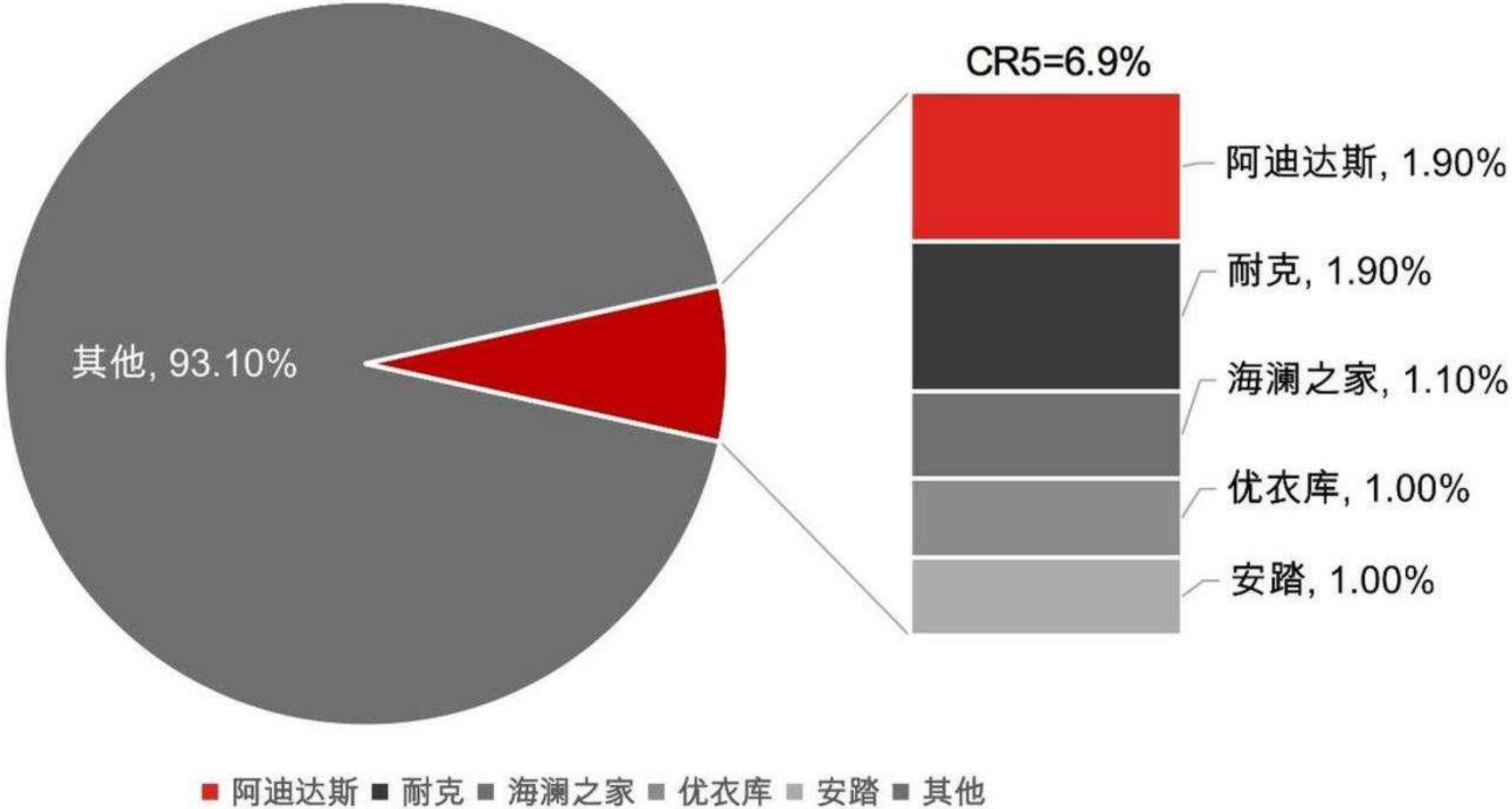
图表4：2019年中国快递行业市场份额情况(单位：%)




2010年空调行业品牌市场集中度
其他, 30.30%
格力, 28.40%
海尔, 19.60%
美的, 7.50%
格兰仕, 7.50%
三菱, 6.70%

图表19： 我国屠宰行业占有率（2019 年）





数据来源：中商产业研究院, 2018年中国服装市场份额

Weaknesses of concentration ratios

- The concentration ratio only reflect concentration in a national market, they do not reflect competition from abroad, arising from imports.
- It provide no indication of the importance of firms in the global market.
- It do not account for competition from other industries, which may be important in the case of substitute goods. E.g. metal, oil.
- It do not distinguish between different possible sizes of the largest firms.

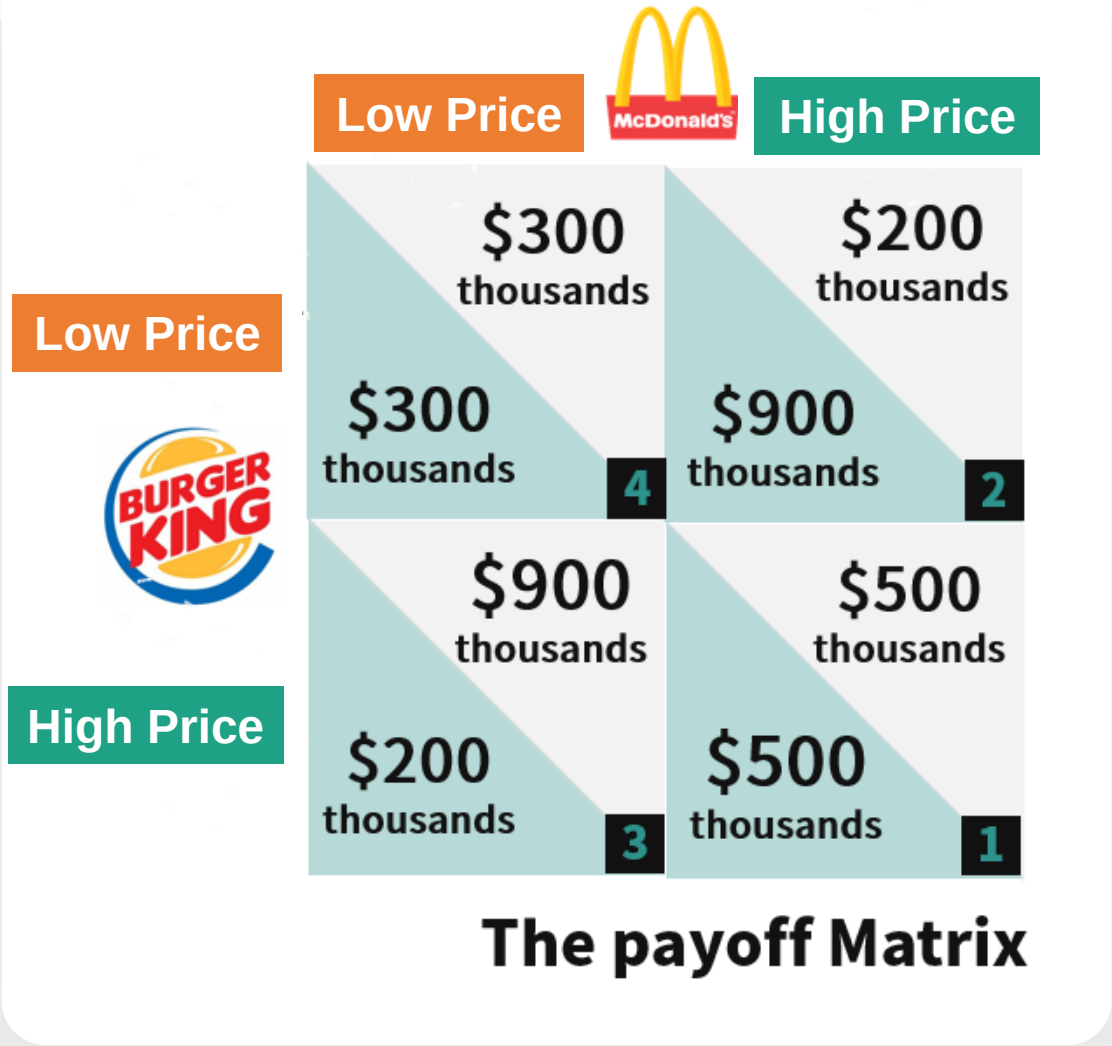
PRISONER'S DILEMMA IN OLIGOPOLY MARKET

Two oligopolistic firms in the same industry – McDonald's and Burger King.

Choose pricing strategy: $7(high price) or $5(low price)

→Choose to...

- Compete?
- OR
- Collude?



PRISONER'S DILEMMA IN OLIGOPOLY MARKET

To compete...

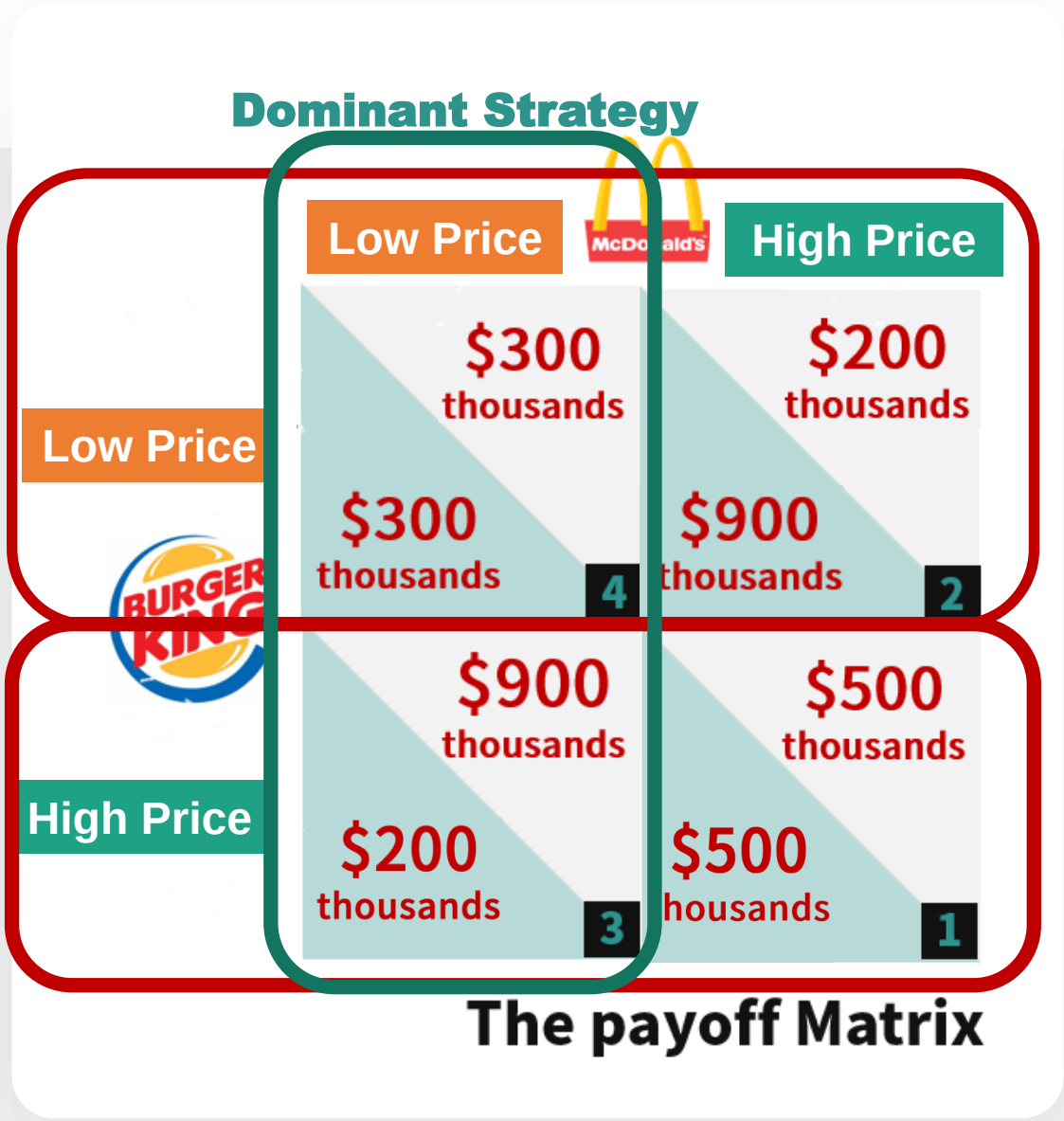
- From McDonald's point of view:
  - If Burger King choose low price...
    - ✓ Choose high price → $100K
    - ✓ Choose low price → $300K.

    →better off with low pricing strategy.
  - If Burger King choose high price...
    - ✓ Choose high price → $600K
    - ✓ Choose low price → $900K

    →better off with low pricing strategy.

  →Dominant Strategy: low pricing strategy
- Both of them thinking the same way, so they may both choose low price

  → Both of them become worse off.

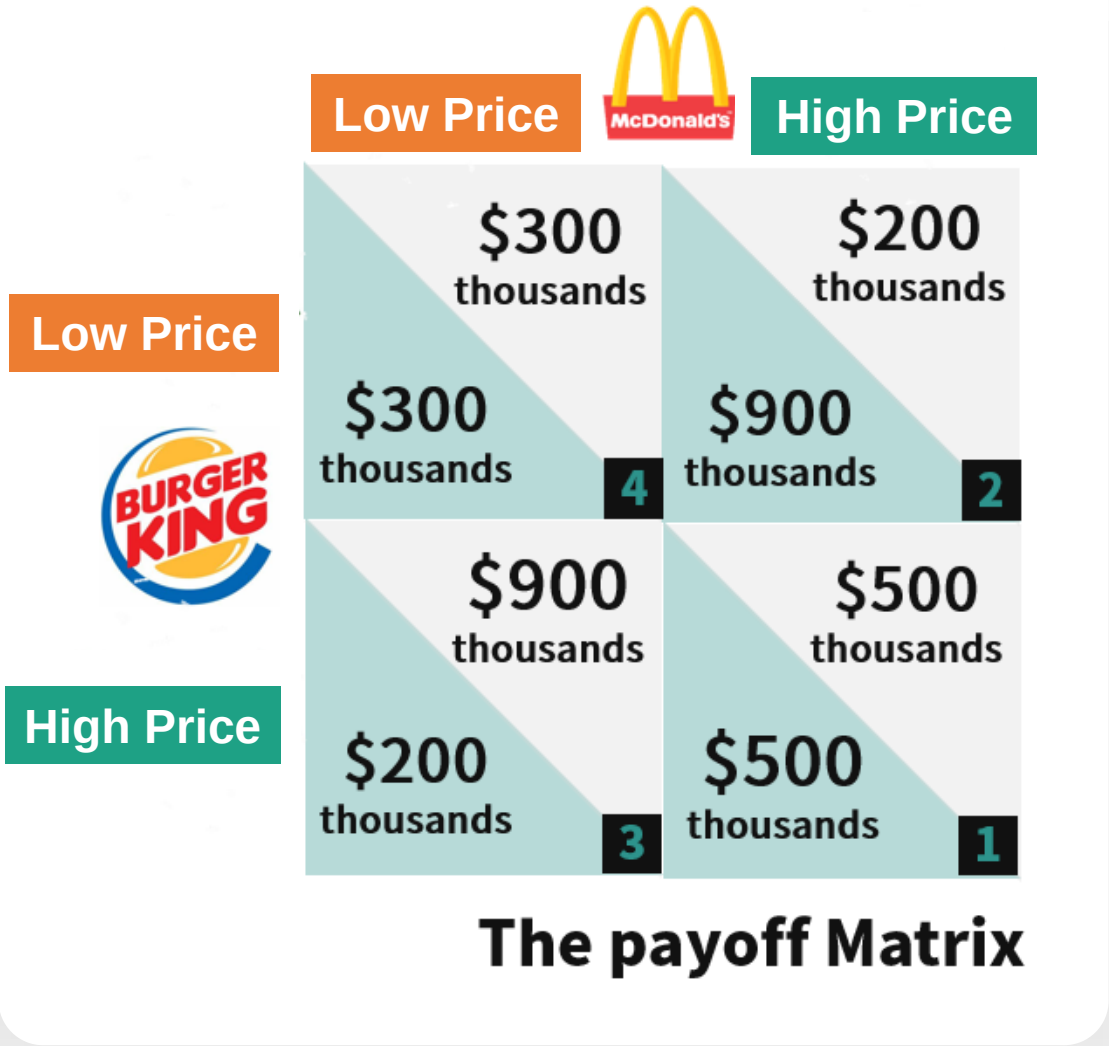


PRISONER'S DILEMMA IN OLIGOPOLY MARKET

To communicate...

Incentive to collude **v.s** Incentive to cheat(compete)

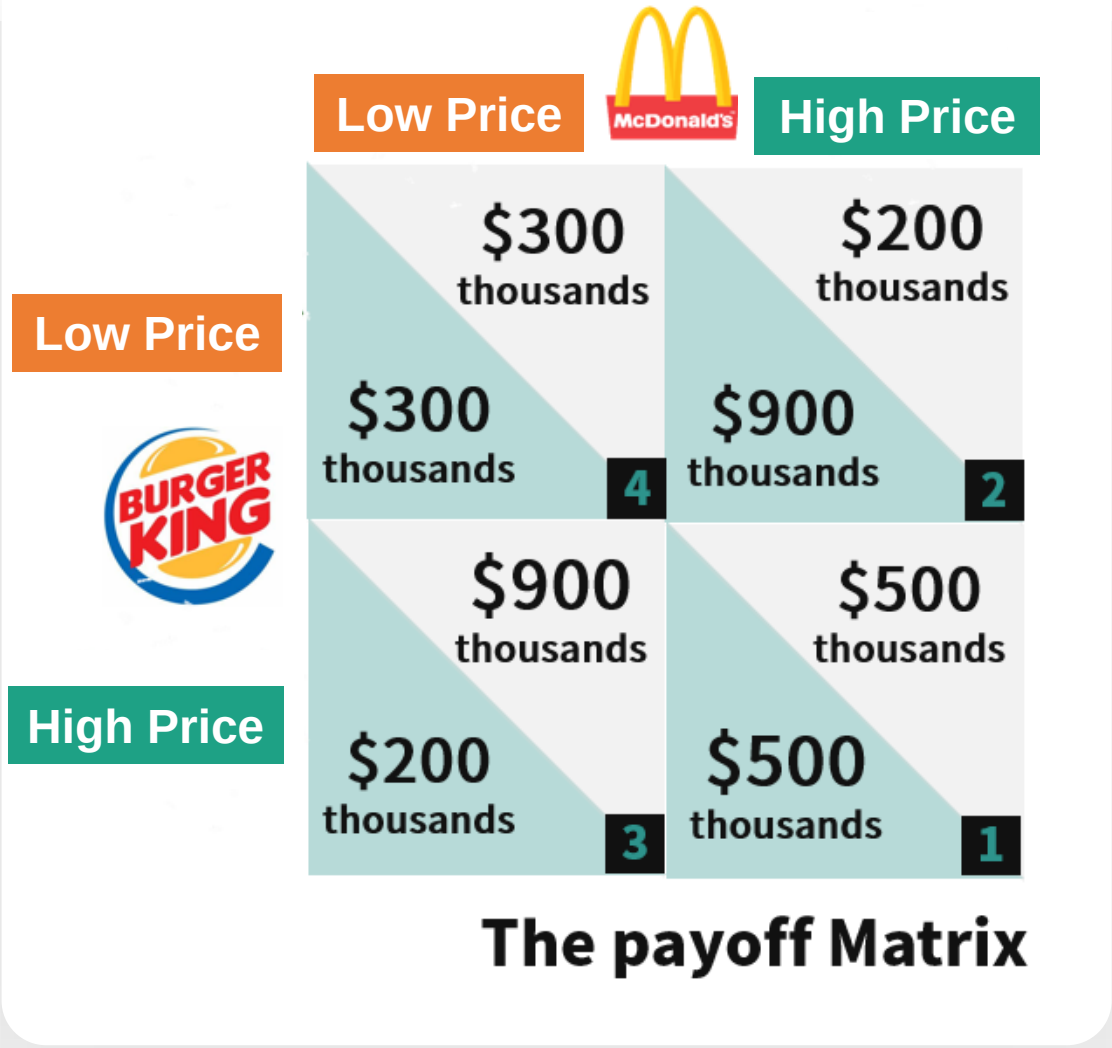
- **McDonald's** realized if they secretly break the agreement and charge a lower price, they may earn $900K and Burger King will earn $200K. There is **incentive for them to cheat**.
- **Burger King** also realized that if McDonld's break the agreement. In that case they can only receive $200K.
- Burger King tries to '**outguess**' McDonld's, thus adopt the low price strategy.
- Both of them thinking the same way, so they may both end up earning $300K profit.
- Both of them become worse off.



PRISONER'S DILEMMA IN OLIGOPOLY MARKET

The game illustrates many real-world aspects of oligopolistic firms, which:

- Are interdependent
- Display strategic behavior
- Face conflicting incentives
  - Incentive to compete
  - Incentive to collude
- Become worse off as a result of price competition → price war
- Have a strong interest in avoiding price wars →strong incentive for them to compete on the basis of factors other than price (non-price competition)

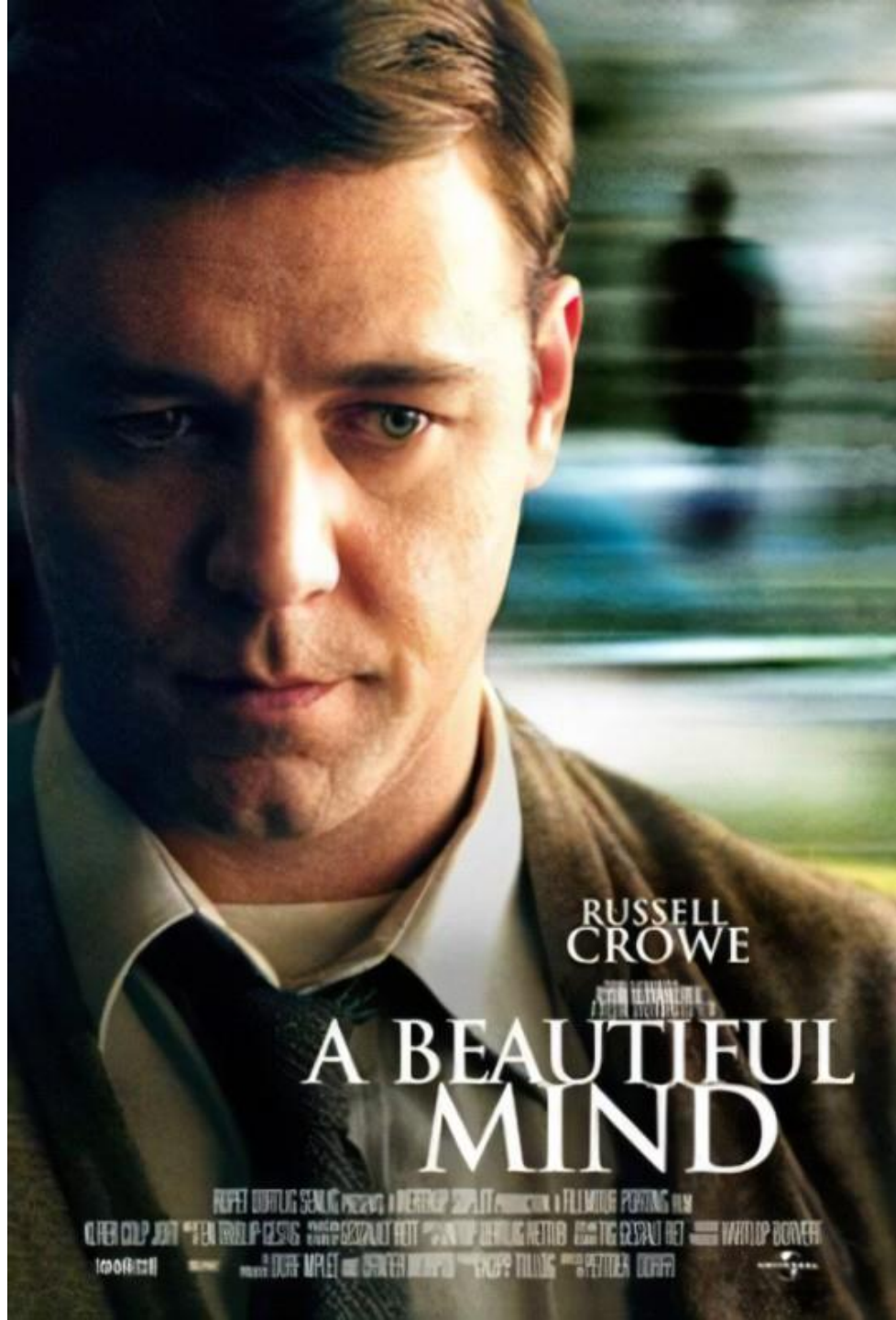


The payoff Matrix

GAME THEORY

Game theory: a mathematical technique analyzing the behavior of decision-makers who are dependent on each other, and who display strategic behavior.

- by John F Nash, American mathematician and economist
- Received the 1994 Nobel prize in Economics together with John Harsanyi and Reinhard Selten)

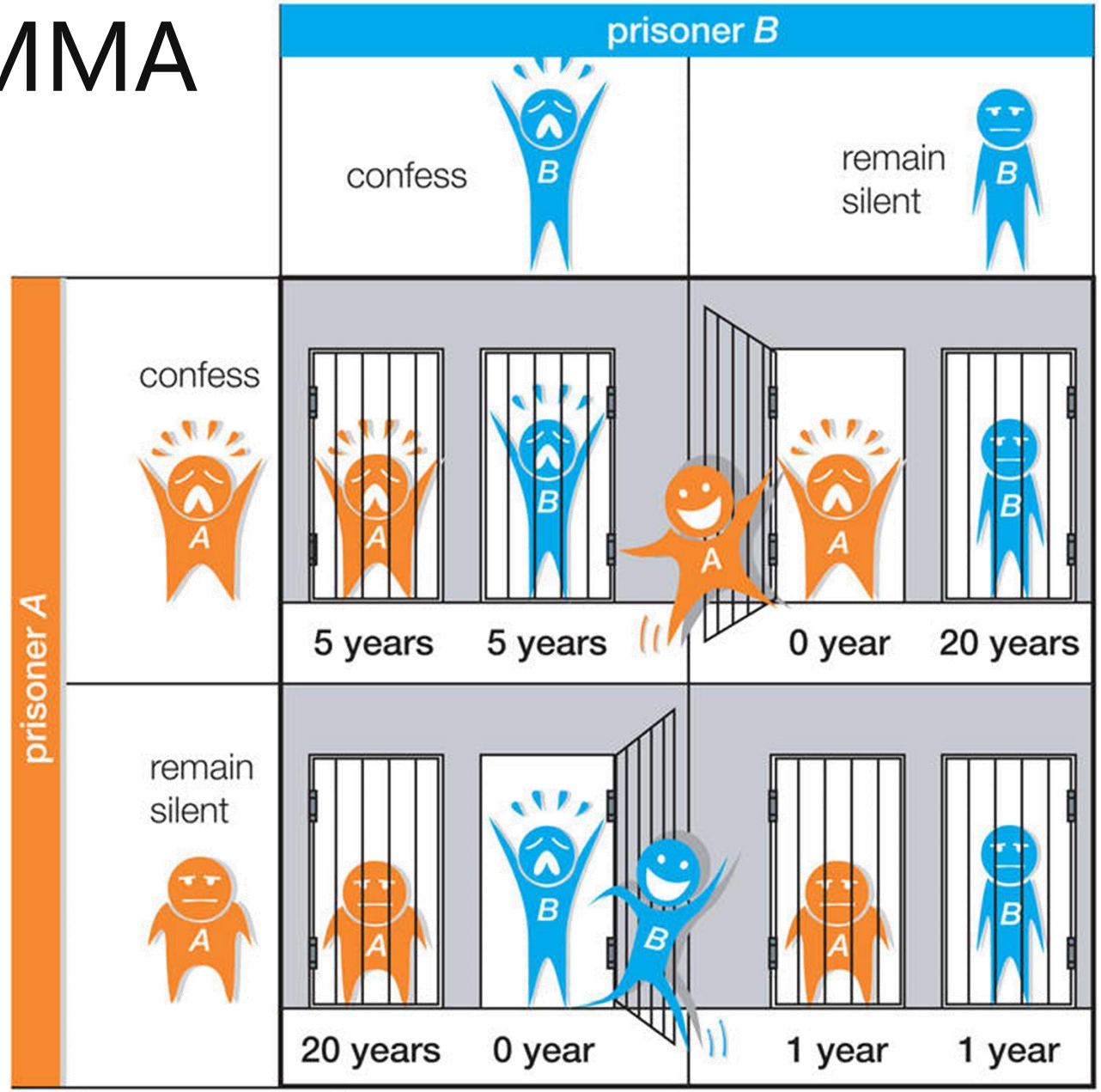


PRISONER'S DILEMMA

Prisoner’ s dilemma - two rational individuals making decisions in their own self-interest cannot result in an optimal solution.

- Each player has an incentive, regardless of what the other player does, to cheat – take an action that benefits it at the other’ s expense.
- When both players cheat, both are worse off than they would have been if neither had cheated.

→ **Nash equilibrium**



Behavior Economics

Loss aversion: the pain of losing is psychologically twice as powerful as the pleasure of gaining.

Potential gain v.s Potential loss

NASH EQUILIBRIUM

The Nash equilibrium shows that there is sometimes a conflict between the pursuit of individual self-interest and the collective firm interest. This conflict is the prisoner's dilemma. Although the firms could be better off by cooperating, each firm, trying to make itself better off, ends up making both itself and its rival **worse off.**

Cooperation V.S self-interests

Oligopolists would be better off cooperating and reaching the monopoly outcome. Yet Each oligopolist is tempted to raise production and capture a larger share of the market. As each of them tries to do this, total production rises, and the price falls.

People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or some contrivance to raise prices.

-- Adam Smith

Oligopoly

"It's Just a Game"


MAIN MENU
Formal collusion >
Informal collusion
Price competition
Non-price competition
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Collusive oligopoly

Collusive oligopoly refers to situations where firms agree to collude, which means they form an agreement between themselves to limit competition, increase market power and increase profits.

Gain:

- Increased market power → ability to control price
- Increased profits due to higher prices
- Elimination of competition between the firms, and therefore no more uncertainty or need to outguess their rivals.

→ Collusion is **illegal** in most countries. But it is difficult for authorities to discover and prove the existence of a collusion.

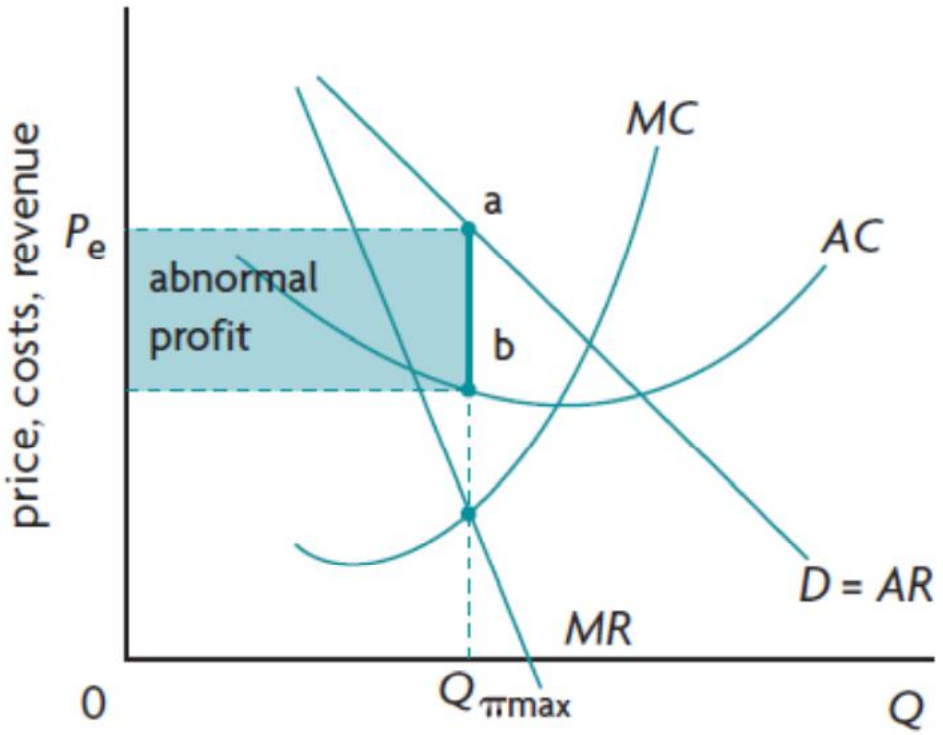
Formal collusion - Cartels

- A common type of collusion.
- **Formal agreement** between firms in an industry to take actions to limit competition in order to maximize joint profits.
- Cartel members **collectively behave like a monopoly.**

- Actions:
  - Limiting and fixing the quantity to be produced by each firms → increase in price.
  - Fixing the price at which output can be sold
  - Dividing the market according to geographical or other factors
  - Agreeing to set up barriers to entry.

Illustration in diagram

- Because Cartel members collectively behave like a monopoly, The demand and MR curve are for the industry as a whole.
- The Cartel equates **MR with MC** to find the cartel's profit-maximizing level of output **$Q_{\pi max}$**, find the price **P_e**.

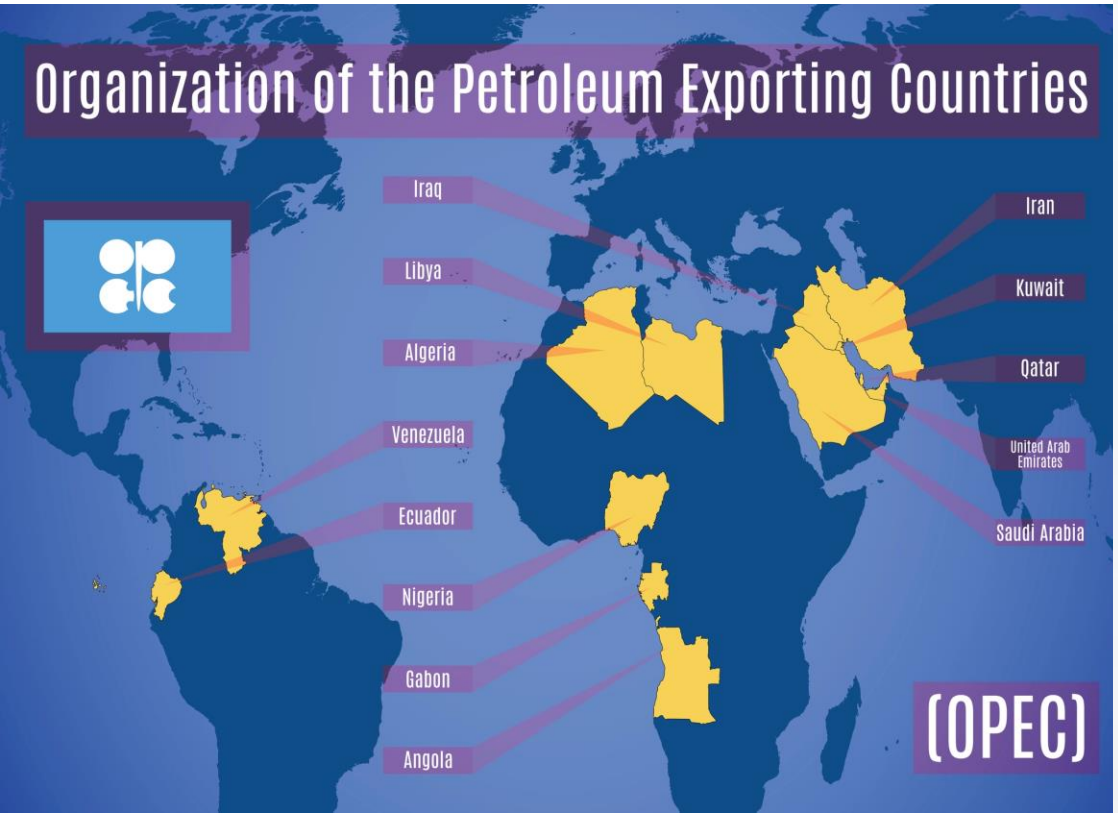


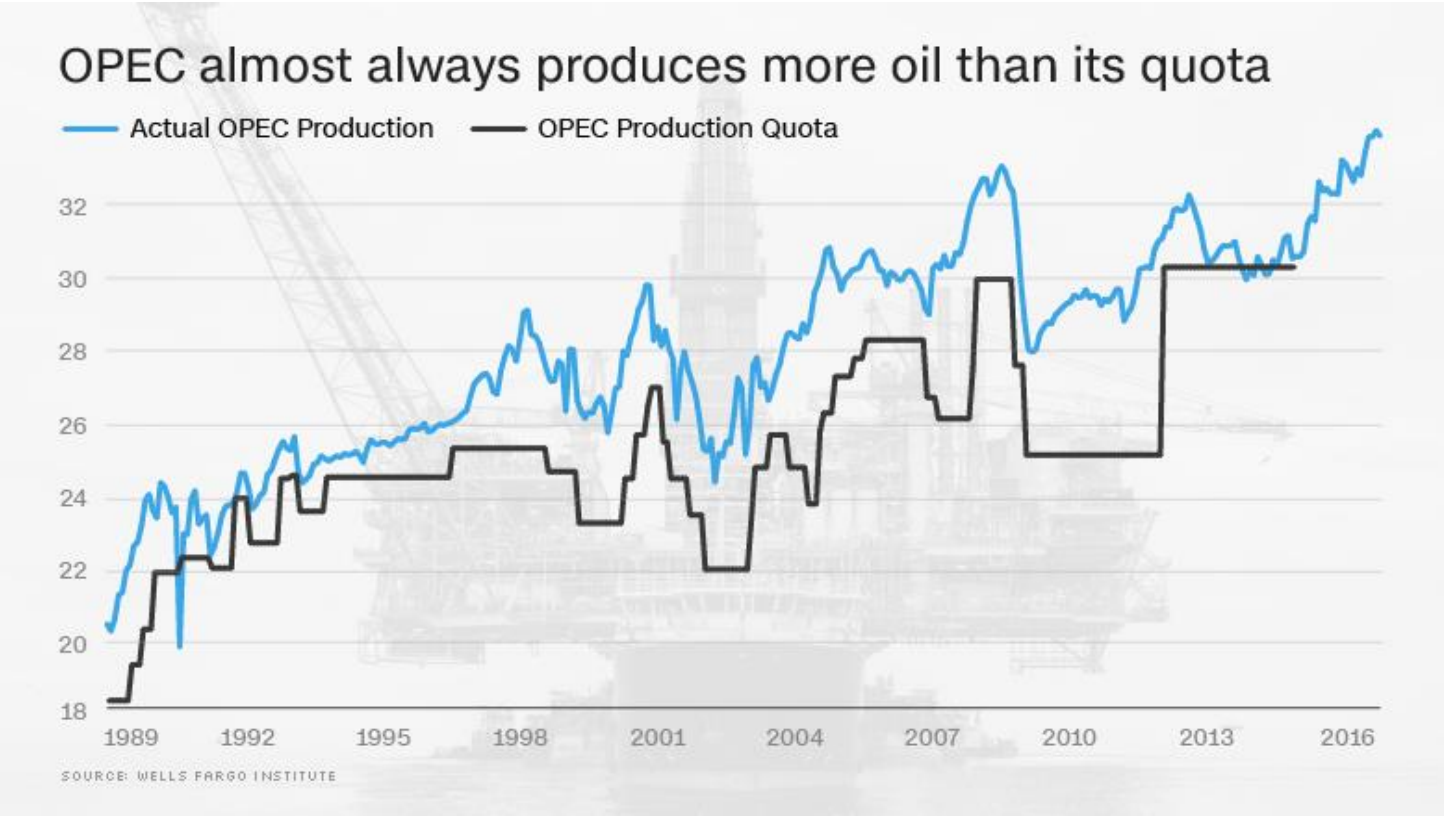
- Make agreement on how much of the total quantity will be produced by each firm:
  - ✓ Decide the output based on historical market shares.
  - ✓ Agree to compete with each other for market shares using non-price competition.

➢ Allocative inefficiency (P>MC)

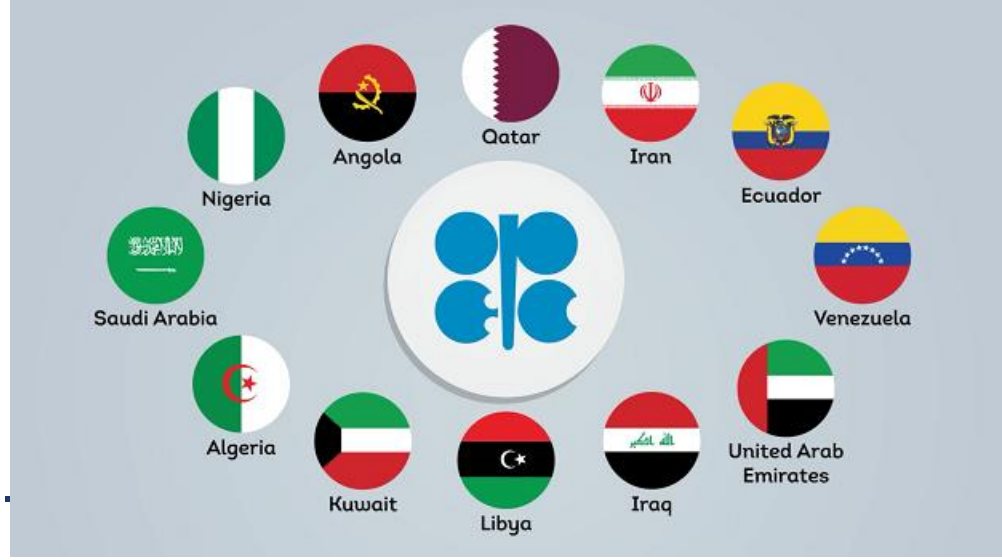
➢ Productive inefficiency ($Q_{\pi max} < Q_{p.e}$)

REAL-WORLD EXAMPLE -OPEC





Real-world case - OPEC



Organization of the Petroleum Exporting Countries.

- A group of **13** oil-producing countries. These countries control about ¾ of the world's oil reserves.
- Like any cartel, OPEC tries to raise the price of its product through a coordinated **reduction in quantity produced**. Each member country is assigned an output level (quota) that it is permitted to produce.→ **higher price**
- From 1973 to 1985, The price of crude oil rose from $3 a barrel in 1972 to $11 in 1974 and then to $35 in 1981. But in the mid-1980s, member countries began arguing about production levels, and OPEC became ineffective at maintaining cooperation**. By 1986 the price of crude oil had fallen back to $13 a barrel**.
- The OPEC countries would like to maintain a high price of oil. But each member of the cartel is tempted to increase its production to get a larger share of the total profit. OPEC members frequently agree to reduce production but then cheat on their agreements.

Obstacles (reasons for collapse)

1. **The incentive to cheat** on the agreement, by offering to secretly lower the price for some buyers. (or by raise the output)
   - The agreement may collapse if many firms cheat, or if cheating is discovered by other firms in the cartel.
2. **Cost differences between firms**.
   - Firms with higher average costs → lower profits.
   - Firms with lower average costs → higher profits.

   →Hard to agree a common price.
3. **Number of firms**
   - The more firms in the industry, the more difficult to arrive at an agreement regarding price and the allocation of output.
4. **The possibility of a price war**
   - A possible outcome of one or more firms cheating on the cartel agreement is a price war.
   - It makes all the firms of an industry collectively worse off. (lower price, lower profit)

Obstacles (reasons for collapse)

6. **Recessions**
   - Firms have strong incentive to lower prices in order to survive.
7. **Potential entry into the industry**
   - If there are new entrants, it will drive price down cutting into the cartel's profits.
8. **The industry lacks a dominant firm**
   - often, a cartel is led by the dominant producer. If no such dominant firm exists, it may be difficult to maintain agreements.


MAIN MENU
Formal collusion
Informal collusion
Price competition
Non-price competition
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Informal types of collusion

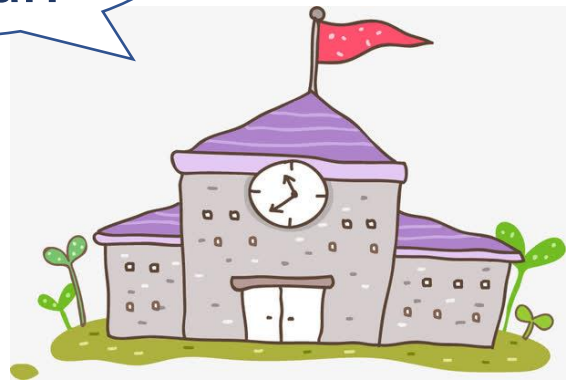
Informal collusion refers to co-operation that is implicit or understood between the co-operating firms, **without a formal agreement.**

- **Objectives:**
  - Co-ordinate prices
  - Avoid competitive price-cutting
  - Limit competition
  - Reduce uncertainties
  - Increase profits.

Price leadership

We will charge
200 RMB/hour

Roger! 200
RMB/hour!



I will charge
210 RMB/hour

190 RMB/hour
for me >.<

Price leadership

- A **dominant firm** in the industry (largest or the one with lowest costs) **sets a price** and also **initiates any price changes**.
- The **remaining firms** in the industry become **price-takers**, accepting the price that has been established by the leader.
- Free to engage in non-price competition.
- The price changes tend to be infrequent and are undertaken by the leader only when major demand or cost changes occurs.
- E.g., airline industry, supermarkets, fast food restaurants.

Obstacles (reasons for collapse)

1. **Cost differences between firms**
   - Firms with significant product differentiation
2. **Incentive to cheat** by lowering their price, risks that some firms don't follow the leader.
3. **New entrants** attract the consumers away
4. Informal collusion is **illegal** too

Non-collusive oligopoly

Non-collusive oligopoly refers to oligopolistic firms that do not collude in any way in order to fix or coordinate prices and limit competition.

- They behaves independently.
- Aware of each other in their pricing decisions and display **strategic behavior.**
  - Firms that do not collude are forced to take into account the actions of their rivals in making pricing decisions.
  - Even though the firms do not collude, there is still price stability.
  - Firms do not compete with each other on the basis of price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Price rigidity

- In real world, price of oligopolistic industries tend to be rigid or “sticky”, once a particular price is reached, it tends to be relatively stable over long periods of time.
- If the price do change, they tend to change together for all the firms in an industry.
- In collusive oligopoly as well as non-collusive oligopoly.

→**The kinked demand curve model**

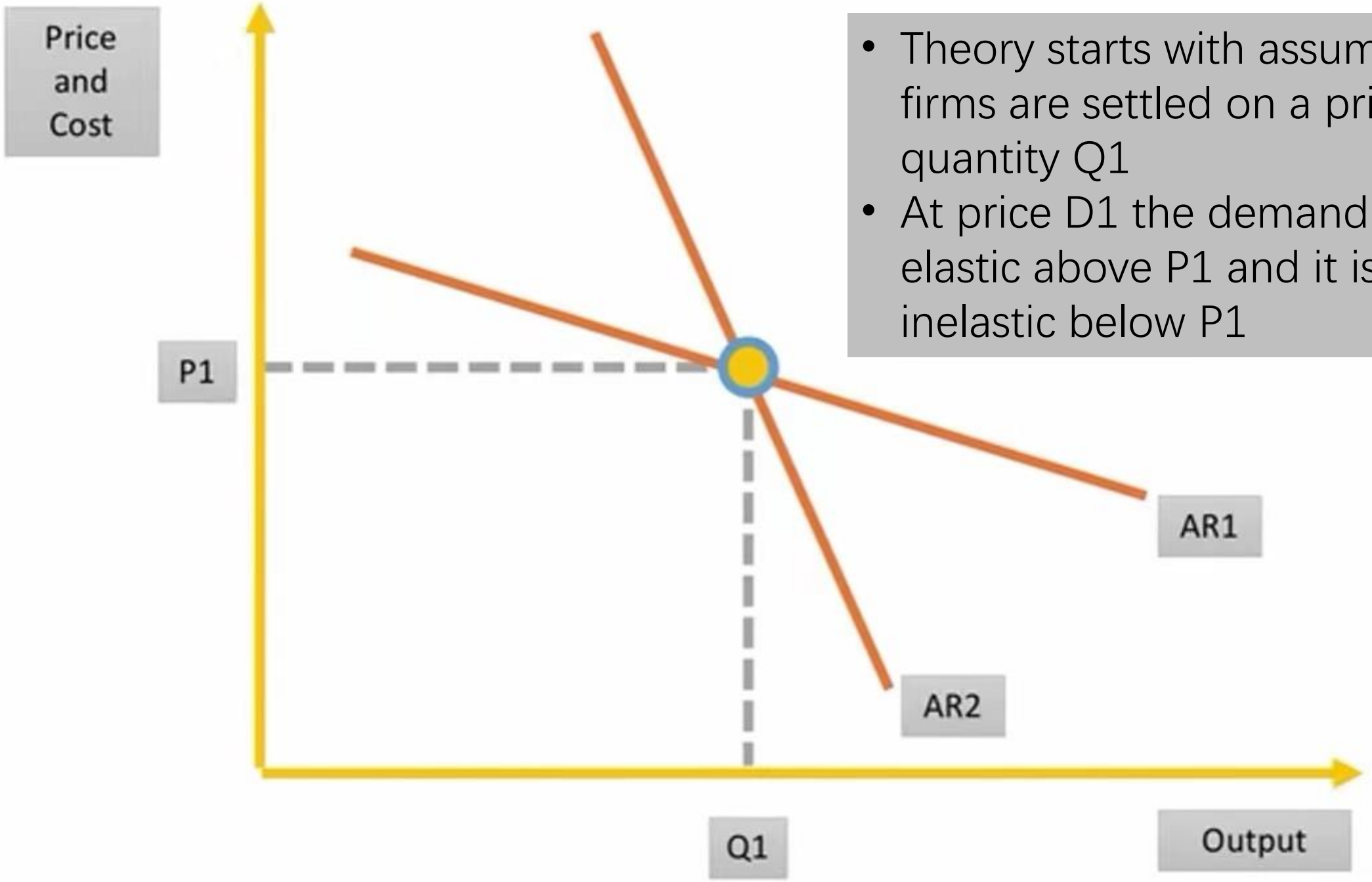
- It is a model that has been developed to explain price rigidities of oligopolistic firms that do not collude.

Example to explain the price rigidity

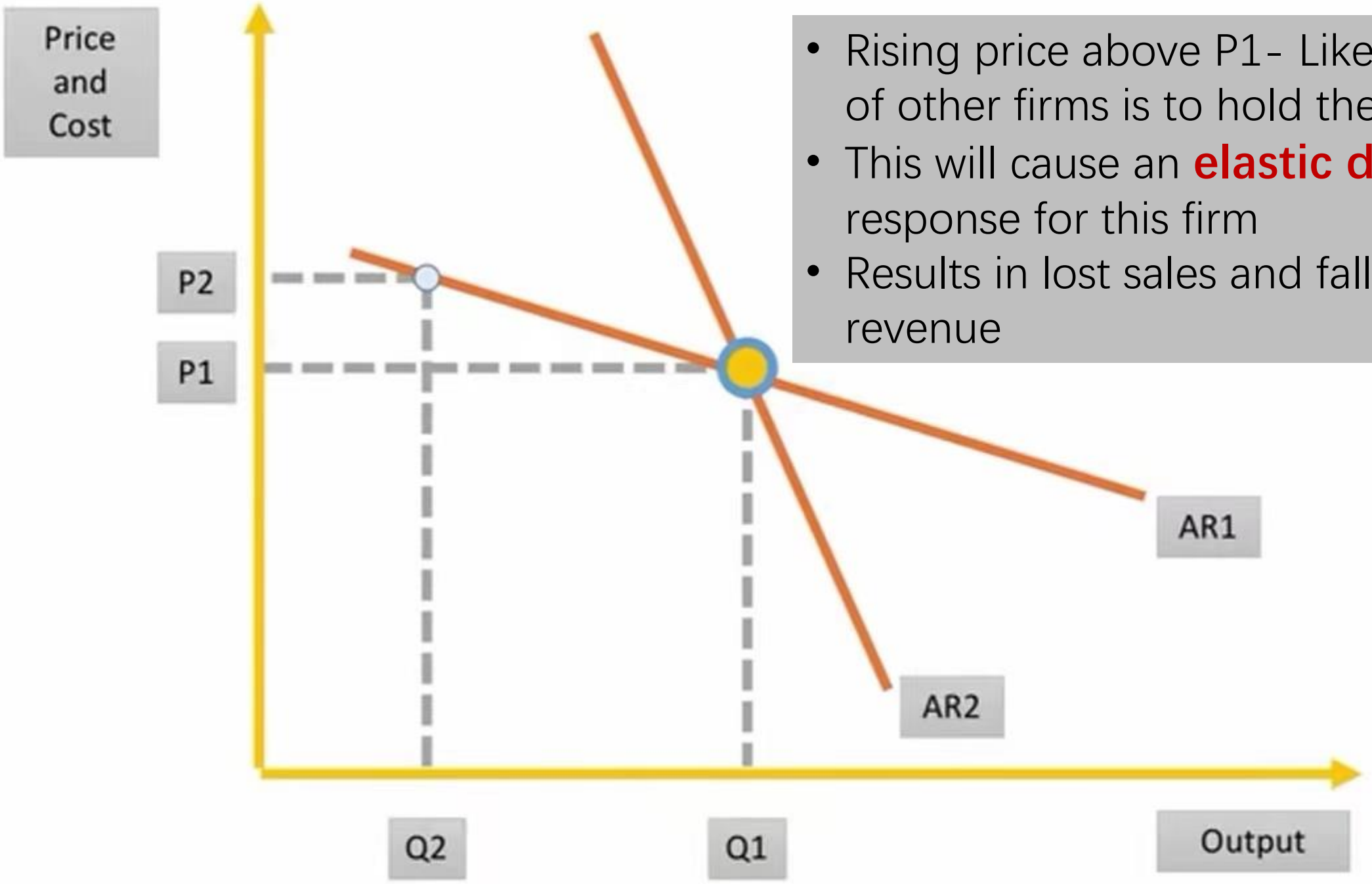
- A business in an oligopoly faces a downward sloping demand curve but the price elasticity of demand may depend on the **likely reaction of rivals** to changes in one firm's price and output.

- Oligopolistic firms A,B and C producing a similar product. Here is the consideration of firm A if it wants to change its price:
  - **If I raise my price, what will B and C do**? They are unlikely to increase their price, because if they continue to sell at their lower price they will take away a portion of my sales, they will be better off and I will be worse off. Therefore **I should not increase my price**.
  - **If I drop my price, what will B and C do?** They are likely to drop their price as well, and so as a result, I am unlikely to be much better off than I am now, and I may be worse off with a lower price, **so I should not drop my price**.
- All three firms thinks the same → **price rigidity (price stability)**

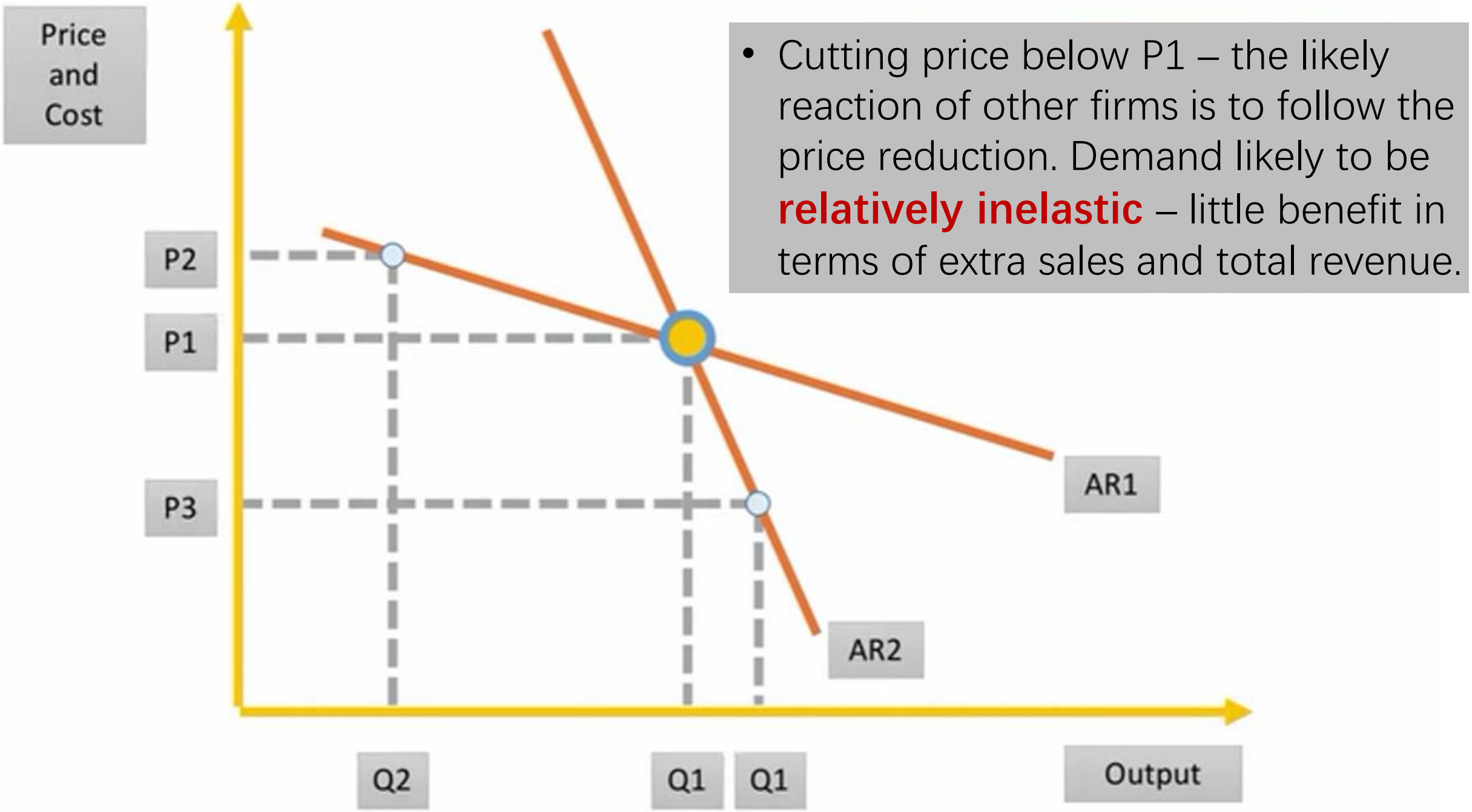
→Firms **do not** compete with each other on the basis of price.



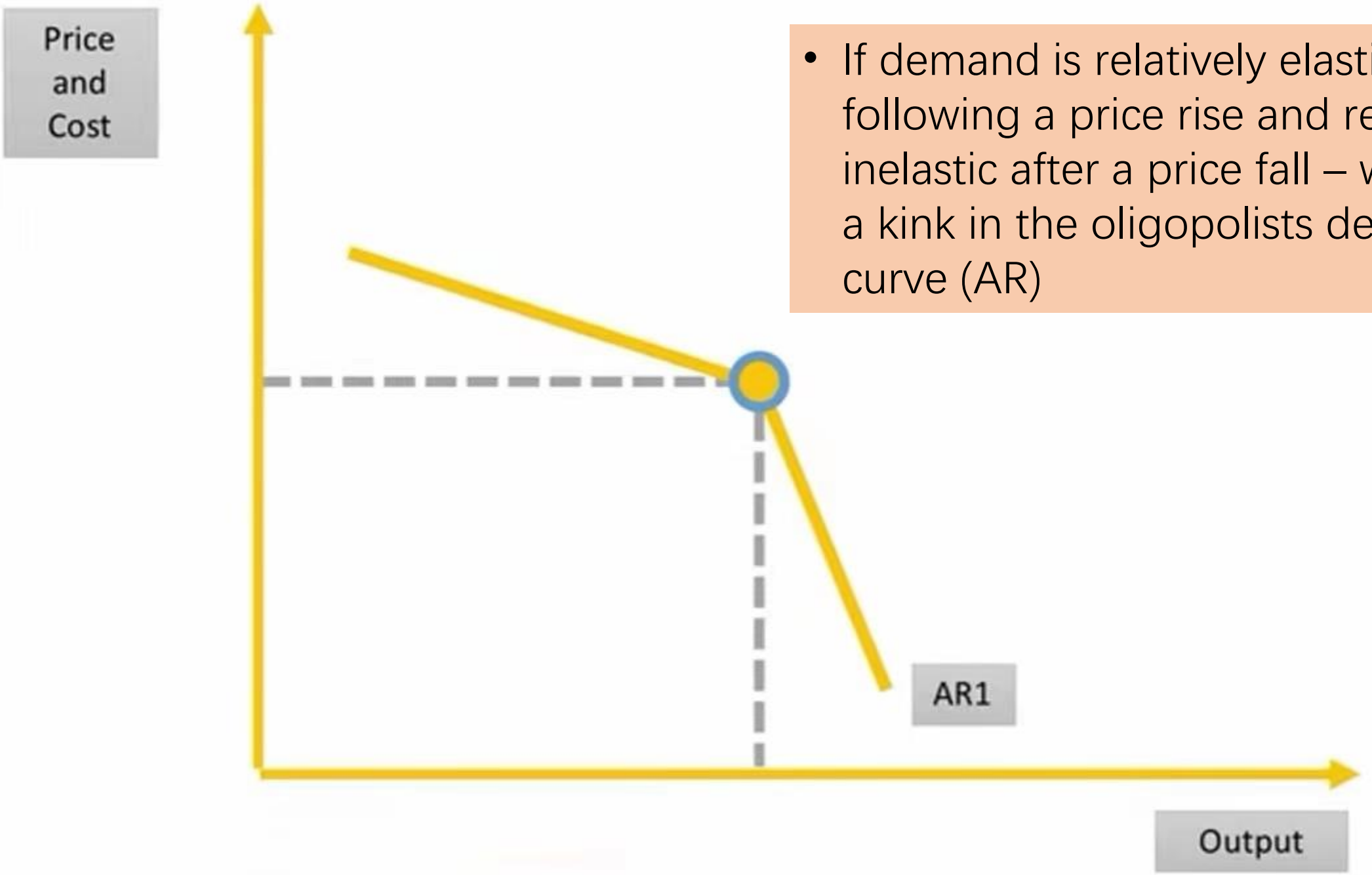
- Theory starts with assumption that firms are settled on a price P1 and quantity Q1
- At price D1 the demand curve is elastic above P1 and it is demand inelastic below P1



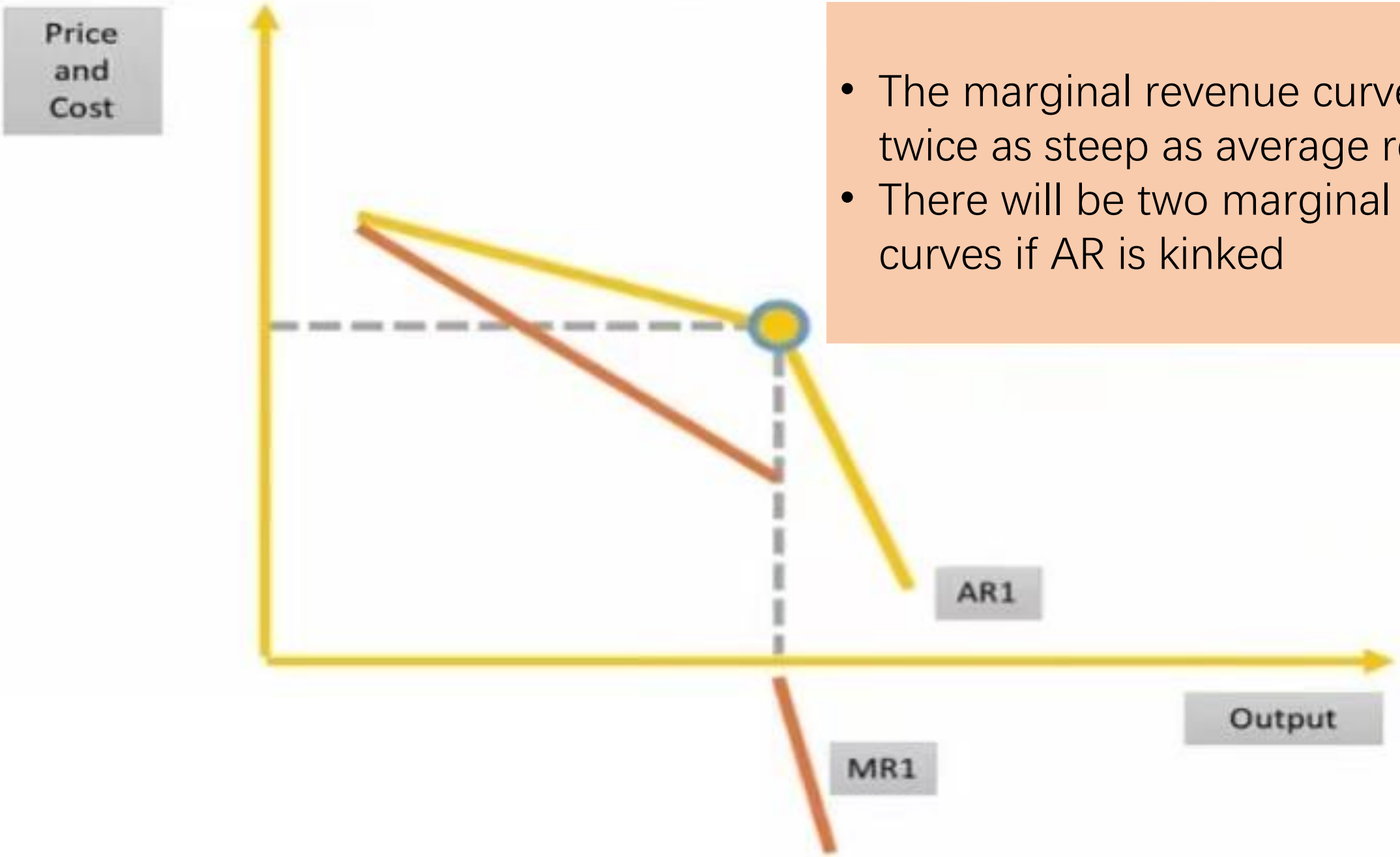
- Rising price above P1- Likely reaction of other firms is to hold their prices
- This will cause an **elastic demand** response for this firm
- Results in lost sales and falling total revenue



- Cutting price below P1 – the likely reaction of other firms is to follow the price reduction. Demand likely to be **relatively inelastic** – little benefit in terms of extra sales and total revenue.



- If demand is relatively elastic following a price rise and relatively inelastic after a price fall – we create a kink in the oligopolists demand curve (AR)



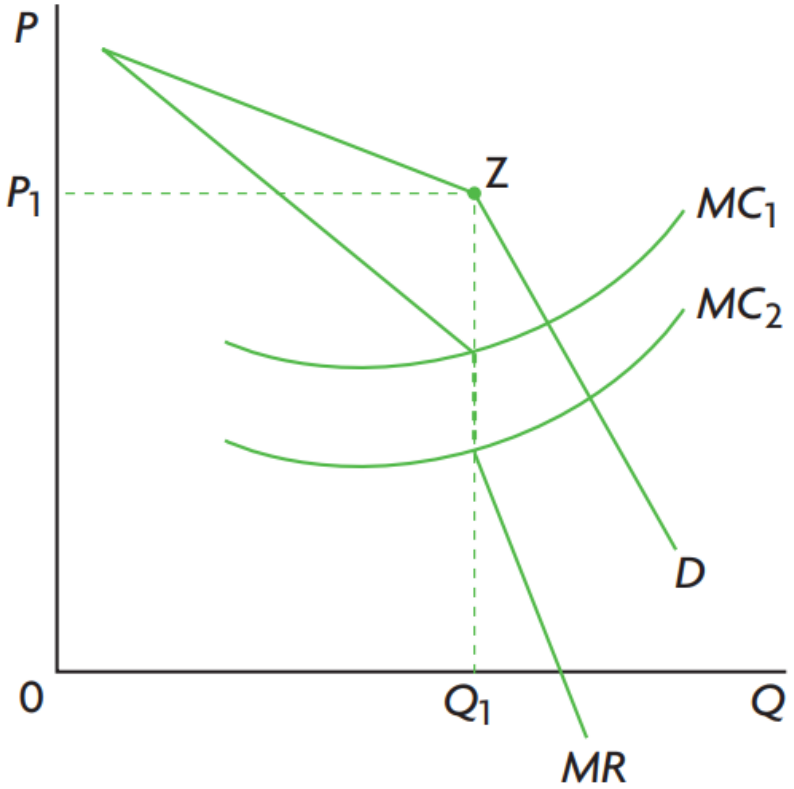
- The marginal revenue curve is always twice as steep as average revenue
- There will be two marginal revenues curves if AR is kinked

The Kinked demand curve

- A business in an oligopoly faces a downward sloping demand curve but the price elasticity of demand may depend on the **likely reaction of rivals** to changes in one firm's price and output.
- Firm A,B,C each produce Q1 and sell it at P1 at Z.
- **If A tries to increase the price**, B and C won't increase their price, A's consumer will be attracted away from A, so for firm A, %ΔP↗ < %ΔQ↘, TR for A will decrease. A's demand curve is relatively **elastic above P1**. So A shouldn't raise its price.
- **If A tries to drop its price**, B and C will also drop their price too. Consumers' purchase keeps unchanged. For firm A, %ΔP↘ < %ΔQ↗, TR for A will decrease too. A's demand curve is relatively **inelastic below P1**, so A shouldn't drop its price.

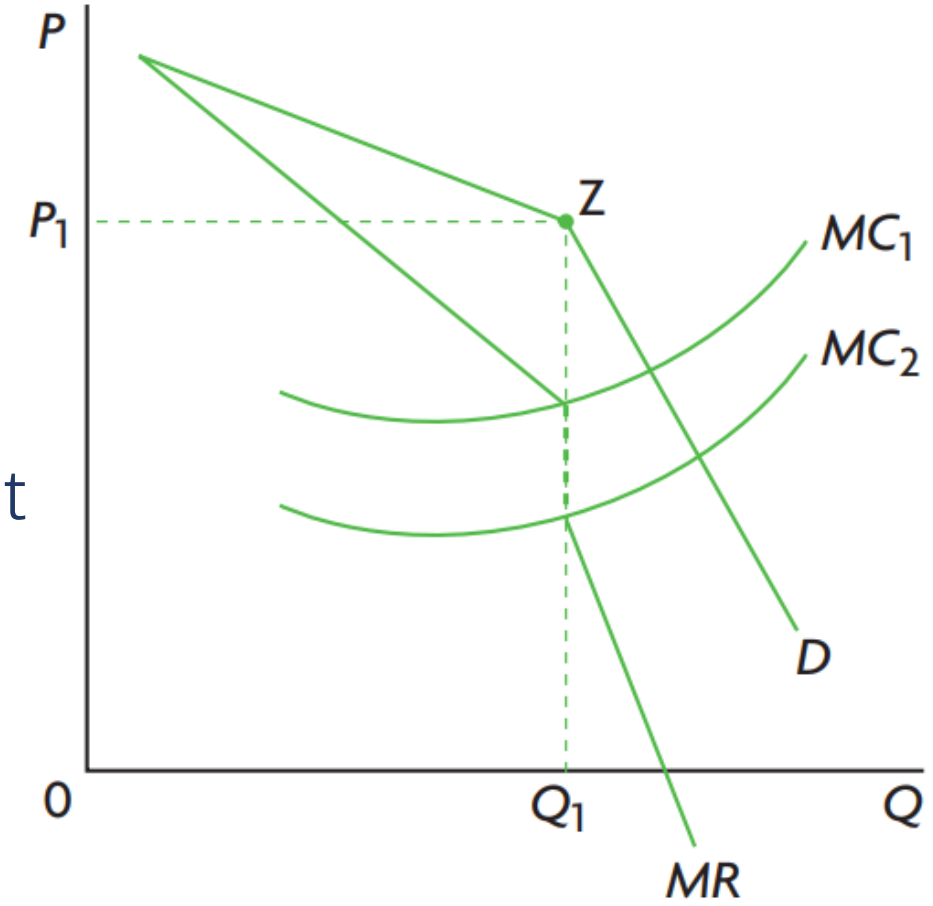
→ A should continue selling at P1.

- **Demand curve suddenly bends at Q1**
- **Broken Marginal revenue curve break in Q1.**



The Kinked demand curve

- The non-colluding firms' price and output decisions is consistent with a whole range of different costs.
- MC1 is the upper limit and MC2 is the lower limit of marginal costs.
- The firm producing output Q1 and selling it at price P1, by using of the MC=MR profit-maximizing rule.



→ No firm takes the initiative to change its price, they all remain "stuck" at point Z for long period of time.

On Oligopoly firms have price-setting power but may be reluctant to use it

Rivals unlikely to match a price rise and rivals likely to match a price fall

If a firm is settled on one price, there may be little intention in changing it

Even if costs change we often see price rigidity/stability in an oligopoly

This increase the importance attached to non-price competition


MAIN MENU
Formal collusion
Informal collusion
Price competition
Non-price competition >
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Non-price competition in Oligopoly

Oligopoly always try to **avoid price competition. (price war)**

- a price war may even lead to prices lower than average costs, and therefore losses.

→Intense non-price competition

1. Product development
2. Advertising
3. Branding
4. Numerous services (quality customer services, warranties, provision of credit, discounts on upgrades and others)

Non-price competition in Oligopoly

Reasons for non-price competition

1. Large Financial resources (due to large profits) can use in R&D, advertising and branding.
2. The development of new products provides firms with a competitive edge.
   - Increased market power
   - PED become more inelastic
   - Increased sales and profits.
3. Product differentiation can increase a firm's profit position without creating risks for immediate retaliation by rivals.

Benefits of oligopoly

- **Economies of scale** → lower production cost → lower price for consumers, beneficial for society.
- **Product development and technological innovations** due to high abnormal profits. (more important than in the case of monopoly) – increase market and profits.
- Technological innovations that **improve efficiency and lower cost of production may be passed to consumers** in the form of lower prices.
- Product development leads to **increased product variety**, thus providing consumers with greater choice.

Criticisms of oligopoly

1. Welfare loss, allocative inefficiency and productive inefficiency.
2. Higher prices and lower quantities of output (compare to P.C)
3. Loss of consumer surplus to the oligopolists.
4. Negative impacts on the distribution of income.
5. There may be higher production costs due to lack of price competition. (X-inefficiency)
6. Possibly less innovation.
7. Difficulties of detecting and proving collusion among oligopolistic firms. Such firms may actually behave like monopolies by colluding and get away with the anti-monopoly legislation.