INTRODUCTION TO MICROECONOMICS

基本微观经济学

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9 Competitive Market, 完全竞争市场

9.1 Market Structure and Firm Behaviour, 市场结构与公司行为

Market structure is the genetic feature that affects firm behaviours (i.e. degree of market power). This includes:

1. Number and size of firms
2. Type of good - degree of product differentiation
3. Freedom of entry and exit
4. Pricing behaviour

Market power is a single firm's ability to affect the commodity's price.
Competitve behaviour is to have some market power.

9.2 Theory of Perfect Competition, 完全竞争理论

Perfectly competitive market structure has NO market power, as not one firm in this market can affect the commodity's price.
This market structure has 3 characteristics:

1. Many many sellers
2. Selling a homogeneous (identical) good
3. Free entry and exit

$1 + 2$: Firms are **price takers**.
3: Firms will produce at LRAC's minimum.

9.2.1 Demand curve, 需求曲线

Since firms are price takers, the demand curve for the **industry** is still downward sloping, but for each **firm**, the demand curve is horizontal.
This means:

1. The firm can sell all it wants at the going price.
2. If a firm raises its price, it loses all buyers.
3. If a firm lowers its price, it loses its profits.

9.2.2 Revenue, 营业额

Due to its horizontal demand curve, for any firm in perfect competition, we have the following relation:

$$P = AR = MR$$
$$\frac{TR}{Q} = \frac{\mathrm{d}TR}{\mathrm{d}Q}$$

9.3 Theory of Profit Maximization, 利益最大化理论

To maximize profits, any firm should follow two rules:

1. Firm should only produce when it can cover **TVC**, that is $TR \geq TVC$ or $P \geq AVC$
2. Firm should produce up to the output when $MR = MC$.

9.4 Short Run Production Decision, 短期生产

Case 1: Economic Profit

1. $MR = MC$, find P and Q at intersection.
2. $P > AC$

Case 2: Normal Profit

1. $MR = MC$, find P and Q at intersection.
2. $P = AC$

Case 3: Economic Loss

1. $MR = MC$, find P and Q at intersection.
2. $AVC < P < AC$

Case 4: Shut-down point

1. $MR = MC$, find P and Q at intersection.
2. $P = AVC$

In the short run, the marginal cost curve above the AVC is the firm's supply curve.

9.5 Long Run Production Decisions, 长期生产

9.5.1 Entry and exit, 进入与退出

When firms are producing at an **economic profits**, new firms are incentivized to **enter**.
When firms are producing at a **normal profit**, there will neither be entry nor exit.
When firms are producing at an **economic loss**, current firms will exit the industry.
For example,

> If original supply S_1 and demand D for the industry has an equilibrium price at P_1, and $P_1 > AC$, then new firms will enter, shifting S_1 to the right to S_2, where the new equilibrium price is P_2. In this case, $P_2 = AC$.
> Industry output will rise, but firm output will fall.

9.5.2 Long run equilibrium, 长期平衡

From the previous entry and exit behaviour, firms will produce at the minimum of SRAC. Since LRAC would lie below SRAC, firms will lower costs even further (e.g. increasing the size of production). This will lead to firms increasing output until $Q_{output} = MES$ (minimum efficient scale).
At this equilibrium we have

1. $P = MR = MC$
2. $P = \min SRAC$
3. $P = \min LRAC$

Only **normal profits** is possible.
And we have reached productive efficiency and allocative efficiency.
If we assume continuous technological change, then

1. New firms would enter with lower costs.
2. Old firms would still exist as long as $P > AVC$.
3. Price will eventually be determined by the new firms.
4. Old firms would be "economically obsolete", not "physically obsolescent", resulting in closing when $P < AVC$.

In other cases, an industry can be declining because the industry in long-run equilibrium suffers continuous decreasing demand.
The firms will respond by trying to cut costs, leading to failure to upgrade equipment, and eventually leading to long-run losses, a "vicious cycle".
In this case, the government may intervene by subsidizing these industries to "save jobs".

10 Monopoly, 垄断市场

10.1 Theory of Single-price Monopoly, 单一价格垄断

There are 3 characteristics of a single-price monopoly structure:

1. One seller
2. Selling a unique good
3. Impossible to enter or exit

In this case, the firm is a **price setter**.

10.1.1 Demand curve, 需求曲线

Since the firm is the industry, the demand curve will be **downward sloping**.
The firm will then set a price to maximize profits. What price will the firm sell its goods at?
Firstly, a monopolist will never produce when $\epsilon < 1$, as this is equivalent to $MR < 0$, leading to profit loss.
Secondly, we know $P = AR = a - bQ$, then $TR = PQ = aQ - bQ^2$, so

$$MR = \frac{\mathrm{d}TR}{\mathrm{d}Q} = a - 2bQ$$

giving us the marginal revenue drop decreasing twice as fast as the demand curve.

10.2 Short Run Profit Maximization, 短期利润最大化

A monopoly maximizes its profits by producing when $\epsilon \geq 1$, it stays in business ($P \geq AVC$), and where $MR = MC$.
Case 1: Economic Profit

1. $MR = MC$, find Q at intersection.
2. Find P on the demand curve given the above Q.
3. $P > AC$

Case 2: Normal Profit

1. $MR = MC$, find P and Q at intersection.
2. Find P on the demand curve given the above Q.
3. $P = AC$

Case 3: Economic Loss

1. $MR = MC$, find P and Q at intersection.
2. Find P on the demand curve given the above Q.
3. $AVC < P < AC$

For a monopoly, when not producing at profit-maximization outputs, it does not imply an economic loss. Therefore, monopolies have the flexibility to trade off some profit for policies.

10.3 Long Run and Barriers to Entry, 长期生产与参与阻碍

10.3.1 Barriers to Entry

Profits still signal firms to enter a monopoly, so the monopoly must **impede** this incentive.
A **barrier to entry** impedes the entry of new firms into the market.
BTE will thus allow a monopoly to have long run **economic profits**.
The natural BTE includes:

1. High startup costs
2. Economies of Scale, Scope, Network

   Natural Monopoly: occurs when demand is less than MES
   Economies of scale: LRAC falls as the firm produces more of the **same** good
   Economies of scope: LRAC falls as the firm produces **more than one** good
   Network economies: a product's value increases as more people use the product

The artificial BTE includes:

1. Government

   Patents, franchises, charters, licenses, environmental regulations, red tape, procurement policies

2. Firm

   Predatory pricing, product differentiation

In the long run, monopolies reach productive efficiency, but NOT allocative efficiency as there exists DWSL.
In the very long run, monopolies rarely persist as new ideas are created to "destroy" old ideas (creative destruction), creating economic growth, UNLESS, it is protected by the government.

10.4 Cartels, 垄断集团

A **cartel** is a voluntary association of producers who agree to act as a monopoly to maximize **joint profits**.
For example, OPEC is an oil cartel, whose joint decisions led to the oil embargo in 1972 and 1979.
A cartel can form through either formal collusion (formal agreements made) or tacit collusion (no formal agreements made).

10.5 Theory of Multiprice Monopoly, 多价垄断理论

Price discrimination is the **same** producer charges **different prices** for the **same** good (due to elasticity), **for reasons other than costs**.
The conditions for price discrimination are:

1. Monopoly power: the seller can charge different prices
2. Consumers must value different units of the same product differently
3. No arbitrage (consumers buy at a low price and **resell** at a higher price), so that the buyers cannot defeat the seller's objective.

An advantage of general price discrimination is that a part of the consumer's surplus is now converted to the producer's surplus. Then, a perfect price-discriminating monopoly would produce up to Q where $D = MC$. In this case, the consumer surplus triangle is transformed into monopoly profits, and DWSL disappears, reaching allocative efficiency.
There are three types of price discrimination:

1. First degree (Perfect price discrimination) = charging the reservation price
2. Second degree = charging several different prices
3. Third degree = charging different groups

Price discrimination can result in the following ways:

1. Higher profits for the monopoly
2. Higher output from the monopoly
3. Normative effects

    The consumer surplus is transferred to the producer surplus, and the total surplus remains the same.

Another form of price discrimination is **hurdle pricing**, which is the monopolist segmenting the market by charging reservation prices for price-sensitive buyers and the monopoly price for the rest.

11 Imperfect Competition, 不完全竞争

11.1 Structure of the Canadian Economy, 加拿大经济结构

Canada is a large country with a small population

1. Large geography - high transport costs and natural BTE 2. Small population - low demand leads to firms not able to minimize AC, thus leading to a natural monopoly

Canada decides "competition" through the Industrial Concentration Ratio, and the Competition Act states that $CR_4 > 65\%$ means monopoly power.
CR_4: Fraction of total sales controlled by the top 4 firms in the industry; the higher the concentration ratio, the higher the market power.
However, several problems arise from such a measurement:

1. Definition of "relevant market": it depends on the product and geography;
2. It ties competition to the number of firms;
3. It **overstates** the degree of concentration in Canada because Canada is an open economy.

11.2 Imperfect Competition

This type of market exhibits: rivalrous behaviour, with some market power, to set price, within a range There are two market structures of imperfect competition:

1. Monopolistic Competition: Large number of small firms and non-strategic behaviour (ignoring what other firms do) 2. Oligopoly: Small number of large firms, and exhibit strategic behaviour

The characteristics of imperfect competition include:

1. Some to many sellers
2. Products are differentiated
3. Entry and exit are not easy
4. Price setters within a range

The firms in this market structure present these common behaviours:

1. They select their products (differentiated - homogeneous goods in the same market but distinguished in consumer's eyes). And these products are not perfect substitutes.
2. They select their prices (administered - set by individual firms within a range by referring to S and D, but not completely driven by market forces). The prices set tend to be sticky, as firms will respond to changes in demand by adjusting output not price.
3. They engage in non-price competition (e.g. advertisement, warranties, services)

11.3 Monopolistic Competition, 垄断性竞争

The characteristics of monopolistic competition include:

1. Many sellers - non-strategic behaviour, like Perfect Competition
2. Differentiated good - like Monopoly
3. Significant entry and exit - like Perfect Competition
4. Price setter within a range - sticky prices

Therefore, firms in monopolistic competition behave like monopolies in SR, because of differentiation.
They behave like perfect competition because of the significant entry in LR.
In the short run,

> The firm will equate $MR = MC$, and find P based on intersected Q. The firm then makes monopoly profits.

In the long run,

> The firm enjoys economic profits, and signals other firms to enter, shifting the D of each firm to the left until D is tangent to AC. Firms then only make normal profits.

11.3.1 Excess Capacity Theorem

Excess Capacity = Capacity Q - LR Q_E In imperfect competition, there is an excess capacity where firms produce less at higher prices.
It is now accepted that consumers benefit from more brands arising from monopolistic competition.

11.4 Oligopoly, 寡头

The characteristics of monopolistic competition include:

1. Several sellers
2. Similar or differentiated good - present strategic behaviour, they are **interdependent**
3. Formidable entry and exit - firms' output affects industry supply
4. Price setter within a range - administered prices

Oligopoly behaves strategically to have monopoly power over price, usually through merging and acquisition. This is to decrease rivalry and increase profits.
Both natural causes (high start-up costs) and artificial causes (government intervention) can lead to such a market structure.

11.5 Game Theory, 博弈论

A **game** is a decision-making process of 2+ players who are interdependent and know the outcomes
A **simultaneous game** is a game where both players make decisions at the same time.
A **sequential game** is a game where one player makes a decision, then the other reacts.

11.5.1 Simultaneous game, 同步博弈

The **best response** of a player is the strategy taken when the player cannot gain utility by switching to a different strategy, given the strategy of the other player.
A **Nash equilibrium** is when each player is playing the best responses. An equilibrium is usually reached by rational non-cooperation.
A **dominant strategy** is a strategy that yields a higher payoff, regardless of the strategy of the other player. A **prisoner's dilemma game**（囚徒困境）is a game where

1. Each player has a dominant strategy
2. that leads to a Nash equilibrium
3. with a lower payoff
4. than if they had not played their dominant strategy

In general, they are better off cooperating but worse off following self-interest respectively.

The **Pareto optimum** is a situation where one cannot make someone better off without making someone else worse off.

1. Allocative Efficiency = Pareto optimality/efficiency
2. Pareto Improvement is making someone better off without making someone else worse off
3. Pareto Dis-improvement is making someone worse off without affecting others.

11.5.2 Sequential game, 序贯博弈

A **decision tree** is a diagram that shows the possible decisions, in sequence, with the payoffs for each possible decision.
Player 2 will have the best response according to Player 1's choice, thus, through backward induction, Player 1 can have a certain best response.
An **ultimatum game** is when the first player has the power to impose a "take it or leave it" offer. A minimum acceptance threshold can be imposed by the Player 2 in advance.
A **credible threat/promise** is a promise which is in the promisor's interest to perform.

11.5.3 Problems in games and strategic role of preferences

For a game, we may have the players:

1. Not having full knowledge
2. Not having all relevant information
3. Have a commitment problem (player's inability to make a credible promise)
4. Not have a commitment device (methods to create a credible promise by changing incentives)
5. Motivated by self-interest
6. Have an advantage because of first-mover (2 Nash equilibrium)

The solution to a commitment problem can include:

1. Alter the material incentives the players face
2. Alter the psychological incentives the players face and ensure the other party knows of these incentives (Stockholm Syndrome)

11.6 Oligopoly in practice

A **collusion** is an agreement to cooperate to restrict Q and raise P:

1. Explicit/Overt collusion - Can lead to cheating, Conflicts in determining market share of each member
2. Implicit/Covert/Tacit collusion

    May or may not cheat,
    1. Conscious parallelism: recognition of common interests without explicit agreement.
    2. Focal point pricing: MSRP.

There can still be rivalry within collusion: market share competition, and innovation competition.
Contestable markets allow free entry and exit, and allow "hit and run entry".
Oligopoly structures are tradeoffs: monopoly power vs. cost saving and innovation.

12 Efficiency, 市场效率

Efficiency is reached when costs are minimized, both to individuals (productive efficiency) and the society (allocative efficiency).

12.1 Productive Efficiency

This refers to minimizing input holding output constant (LRAC) or maximizing output holding input constant (PPC).
Two types of productive efficiency include:

1. Firm productive efficiency: each firm on LRAC;
2. Industry productive efficiency: each firm has the same MC (no reallocation of output can lower costs)

If all firms and industries are producing efficiently, the economy is productively efficient, thus, on PPC (Economy Allocative Efficiency: at the optimal point of PPC).

12.2 Allocative Efficiency

This means Pareto efficiency/optimality, exchange efficiency, and market efficiency.
This is: minimizing the cost to society, referring to the mix of commodities produced, where consumer and producer coincide in preferences.
For allocative efficiency, we need

$$P = MB = MC$$

thus, firms must be perfectly competitive, there is no DWSL.
Any point on the PPC represents productive efficiency, but only one point on the PPC reaches allocative efficiency.

12.3 Efficiency in Perfect Competition and Monopoly

Perfect competition market structure can reach both productive efficiency and allocative efficiency.
Monopoly market structure can reach productive efficiency (on LRAC, just not minimum), but cannot reach allocative efficiency ($P > MC$, there is a DWSL). However, a perfectly price-discriminating monopoly can reach both.
Single-price monopolies may "offset" the increase in price by reducing costs, therefore, reducing certain DWSL.
It is important to note:

1. Efficiency is not the only goal (equity)
2. Private costs can omit social costs (lead to market failure)
3. Costs are not independent of market structure (Monopolies needed for economies of scale)
4. Monopolies may be needed for innovation.

13 Government Intervention, 政府干预

13.1 Basic functions of government

Government must have **monopoly of violence** through the military and the courts to deprive liberty. It must define and enforce "Property Rights".

13.2 Case for the free market

1. Free market can reach allocative efficiency

   Problem: Most markets are imperfectly competitive

2. Free market coordinates automatically through the price system.
3. It stimulates innovation and economic growth.
4. It decentralizes power.

13.3 Case for government intervention

13.3.1 Monopoly power

It is inevitable because:

Economies of scale, scope, networks
Differentiated products
Innovation

It leads to allocative inefficiency, so the government intervenes with economic policy to balance it.

13.3.2 Externalities, 外部性

Externality is non-priced (excluded from the original D and S analysis) third-party cost or benefit.
A production externality affects supply, and a consumption externality affects demand.
A positive externality is an external economy (increase in S or D), and a negative externality is an external diseconomy (decrease in S or D).

Private cost is an opportunity cost to the seller (seller: first-party, buyer: second-party).
External cost is the opportunity cost of third-party.
Social cost is private cost + third-party opportunity cost to society.

Network externality is the effect of an extra user on others.
Pecurniary externality is not an externality: I buy an iPhone, the price to third-party rises.

To determine social underproduction or overproduction, we first assume perfect competition and no externalities. Then, apply the corresponding externalities to shift S or D. Compare the final Q_E with the original Q_E.

Some common applications of externalities include

1. Environmental pollution
2. Open access resources
3. Highway congestions

13.3.3 Public goods

Public goods are characterized by non-rivalry (consumption of one does not diminish consumption by another) and non-excludability (if produced, it must be consumed equally by all).
By such categorization, we have:

1. Private good: rivalrous and excludable, e.g. chocolate
2. Club good: non-rivalrous and excludable, e.g. art gallery, roads
3. Common property good: rivalrous and non-excludable, e.g. fishery
4. Public good: non-rivalrous and non-excludable, e.g. national defence

The problem with club good:

1. Non-rivalry: $MC = 0$ to produce, so $P = 0$ for efficiency;
2. Excludability: allows market pricing, so $P > 0$ to cover fixed costs
   This leads to inefficiency

The problem with public good:

> One can enjoy a positive production externality. If the good does not exist yet, this then leads to no production.

The problem with common property goods:

> There is a negative consumption externality, leading to the Tragedy of the Commons, the market overuses.

13.3.4 Asymmetry of information, 信息不对称

This means buyers and sellers have different relevant information about the goods. This leads to:

1. Adverse selection
2. Moral hazard
3. Principal-agent problem
4. Signaling

Adverse selection is tilting the selection of goods towards poor quality before a contract is made.

1. Seller knows more - The Lemons Problem
    1. Increase buyer's ability to observe quality
    2. Incentives for truthful quality reporting
    3. Increasing average quality

2. Buyer knows more - Insurance
    1. Group policies (even out the risk)
    2. Screening

A moral hazard is a party that is insulated from risk, after the contract is made, and therefore may behave adversely.

1. Setting up deductible: portion of claim for which policyholder not compensated
2. Co-payment: portion of the fee that the policyholder pays upfront
3. Co-insurance: predetermined apportionment of claim

The principal-agent problem is a type of moral hazard where the agent has the incentive to change behaviour after being hired, and the behaviour of the agent cannot be fully known. This is a sequential game.

1. Flat rate
2. Pay for performance
3. Commission
4. Bonuses
5. Stock options
6. "You're fired"

A signal is a non-free message from the owner of the goods evincing unknown information.

> Education is a classic signalling example, as it signals higher productivity with a university degree.
> This can lead to a prisoner's dilemma effect where all students follow the dominant strategy to attend expensive schools to send better signals, but are all worse off because all spent more money for the same signal.
> These cases do not equate MSB (marginal social benefit) to MSC.

13.3.5 Social goals

These can include

1. Income redistribution
2. Merit goods: health, education
3. Social obligations: military, jury
4. Protecting individuals from others: minimum wage
5. Protecting individuals from themselves: seat belt

They are due to normative "value judgments"

13.4 Case against government regulation

13.4.1 Methods

1. Cost-benefit analysis to determine whether or not the government should provide the public good.
2. Problems arise

1. Quantifying costs/benefits
2. Forecasting
3. Discounting future costs/benefits to present

3. Methods include

    1. Public provision
    2. Redistribution
    3. Regulation

4. Government can induce/impose behaviour, and change incentives.

13.4.2 Costs of intervention

1. Direct Resource Costs
2. Indirect resource costs

    Externalities:
    1. Costs of production: safety standards
    2. Costs of compliance: pay equity
    3. "Rent-seeking": lobbying for economic advantage

13.4.3 Causes of government failure

1. Politicians' self-interests
2. "Public Choice Theory"

    1. Politicians (votes), bureaucrats (authority), and electorates (utility) do not care about the public interest
    2. Rational ignorance: no incentive to become informed, costs > benefits

        No need to be informed on tax lax change (cost), when a vote worth 1 in 30 mn (benefit)

    3. Democracy and inefficient public choice: "One person, one vote" fails to account for preferences, and Arrow's theory of social choice

3. Government monopolies