Chapter 1 Introduction

◆ 1.1 central concepts

➢ Economics

Economics is the study of how people choose to use (limited) resources.

is about (limited) resource allocation.

It is a subject of "choice"

– Why do we need to make choice? Scarcity

   Scarcity of resources: relative to desires

– What is the purpose/target of our choice? Efficiency

   Efficiency: how to allocate scarce resources to satisfy the needs of the society

   (to maximize social welfare).

– How to make better choice?

（案例：轰炸机装甲，裙摆效应）

➢ The Logic of Economics

Economics tries to discover **Causal Relationships** （见作业题）

1. **Correlation** doesn't imply **causation**.

   Just because two things happen together doesn't necessarily mean that one of them causes the other.

2. Time sequencing events or statistical correlations are not causal relationships: the post hoc fallacy.

3. To find out whether one factor X affects another factor Y, we need to hold other factors Z, W, …constant: the failure to hold other things constant.

4. Sometimes we need to consider interactions of many factors (general equilibrium effects): the fallacy of composition.

"Warm Hearts" and "Cool Heads" （见作业题）

➢ Organizational Structure of Economics

•Microeconomics (微观，个体)

–Microeconomics theory

–Industrial organization

–Labor Economics

–Health Economics

–Development Economics

–Public Finance

•Macroeconomics (宏观，总体)

–Macroeconomics theory

–Economic Growth

–International Trade and International Finance

◆ 1.2 cost-benefit analysis & basic economic principles

➢ Cost-benefit analysis (CBA)

•A systematic approach to estimating the strengths and weaknesses of alternatives that satisfy transactions, activities or functional requirements for a business.
•Some costs/benefits might not be that obvious.
（案例：科比上大学）

➢ Basic Economics Principle #1

•People face **tradeoff**
–To get something you want, you have to give up something else you want.
–Scarce resources/constraints

➢ Basic Economics Principle #2

•The cost of something is **what you give up to get it**.
•The opportunity cost of the activity chosen is the highest-valued alternative that we give up to get something.
（案例：临起飞前机票售卖）
•The sunk cost is a fixed cost that cannot be recovered.

➢ Basic Economics Principle #3

•**Rational people think at the margin**.
•Marginal changes : small incremental（增加的） adjustments to a plan of action.
（CBA：边际利润=边际收益-边际成本）

➢ Basic Economics Principle #4

•**People response to incentives**
–either changing the benefits or costs, or both
（案例：Peltzman Effect 汽车安全带）
•People make decisions based on cost-benefit analysis.
•As costs or benefits being adjusted, decisions making will be altered accordingly.

➢ Else

•uncertainty
（案例：停车问题，罚款）
•altruism
•social value
•Basic assumption of economics is rationality:
Individuals, firms and organizations make optimal choices to maximize their welfare. Decisions are based on careful cost and benefit analysis.

Chapter 3 Demand and Supply

（案例：中国房价）

◆ The Market Mechanism

•(Def) A Market is a mechanism through which buyers and sellers interact to determine prices and exchange goods, services, and assets.

– Geographical area;

– Time period;

– Good/service being traded

• The "indivisible hand"

– No single individual or organization or government is responsible for solving the economic problems in a market economy.

– Our society, despite of its fragility (surprise!), functions well for most of the time in a spontaneous manner.

◆ Demand and Demand Function

➢ Demand curve & Demand schedule

Price ($)	Sales
0	8,000
5	7,000
10	6,000
15	5,000
20	4,000
25	3,000
30	2,000
35	1,000
40	0
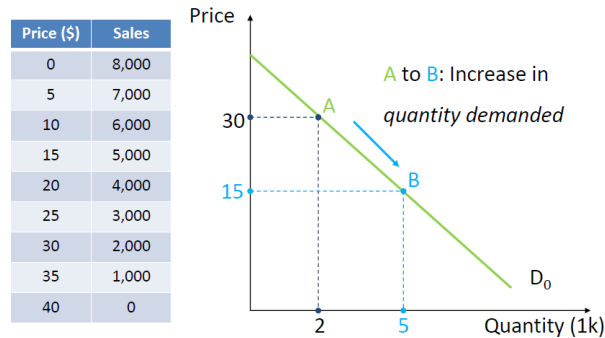
Demand curve based on reservation price(=willing-to-pay)

Remark: same concept can apply to demand for multiple units.
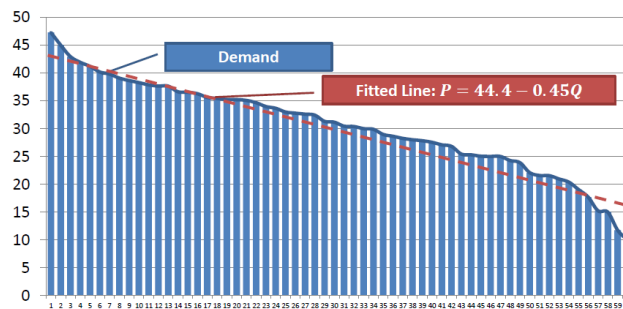
➢ Demand function

• The Demand Function describes the relationship between the amount of a good or service that consumers are willing to purchase.

Q = a-bP, a>0, b>0

• Law of Demand： -b<0

• Inverse Demand Function： P = a/b - 1/b Q

➢ **Consumer surplus**

•Consumer surplus is the monetary gain obtained by consumers because they are able to purchase a product for a price that is less than the highest price that they would be willing to pay.

– The value consumers get from a good but do not have to pay for.

Consumer surplus = Area between consumer price and demand curve

➢ **Determinants of Demand**

1. Income
   • When income increases, demand for certain products/services might increase/decrease.
   • Normal Goods: Income ↑ => Demand ↑ (e.g., Housing)
   • Inferior Goods: Income ↑ => Demand ↓ (e.g., Bus)
   • Inferior ≠ Bad Quality

   Remark: 区分 move along the curve 和 shift curve
   –As income increase, quantity demanded is increased at any given price
   => the curve was shifted to the right (upwards).
   –As price decreases, quantity demanded was increased
   => move along the curve

2. Prices of Related Goods
   •Substitutes
   –If x,y are substitutes, then Px↑ => Qy↑ OR Px↓ => Qy↓ .
   •Complements
   –If x,y are complements, then Px↑ => Qy↓ OR Px↓ => Qy↑.

3. Advertising and consumer tastes
   Advertisement:
   •Functions：
   –Introduce new product
   –Product differentiation
   •Mechanisms in affecting demand:
   –Increase willingness to pay (Unit Demand)
   –Increase quantity demanded at the given price
   => Increase in demand

4. Size of the Market: Population
   消费者数量，消费者年龄结构

◆ Supply and Supply Function

➢ **supply function**

•The supply function describes the relationship between the amount of a good or service that firms are willing to sell and the relevant environmental variables.

$Q = c+dP, c>0, d>0$

(Moving along the curve)
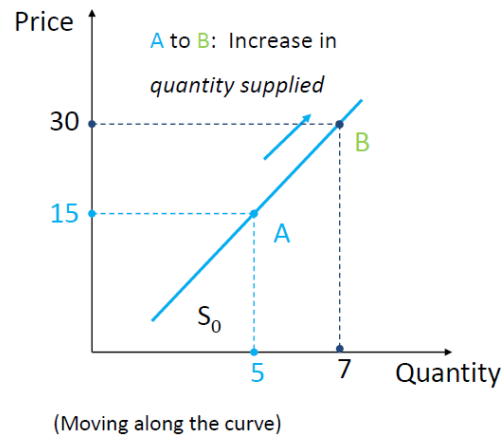
> ## Determinants of Supply

•Input prices

•Technology or government regulations

•Number of firms

–Entry

–Exit

•Substitutes in production

•Taxes

As more firms entry, quantity supplied is increased at any given price. (Shift in the curve to the right/downwards)
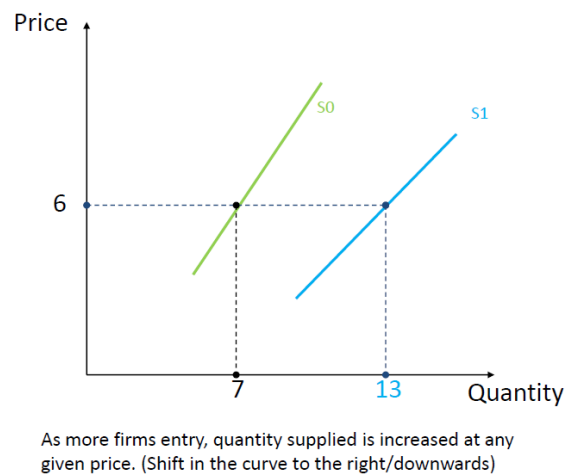
Remark: 行业的供给价格弹性>企业的供给价格弹性　（加总之后变得平缓）
　　　　但行业的需求价格弹性<企业的需求价格弹性（一般成立，行业比企业难找替代品）

◆ Market Equilibrium

Condition for market clearing: $Q^D = Q^S$
Low price=>shortage
High price=>surplus

◆ Price Restrictions

•Price Ceilings=>shortage

–The maximum legal price that can be charged.

•Price Floors=>surplus

–The minimum legal price that can be charged.
（案例：70 年代石油危机）

Price Floor (1)：Minimum Wage
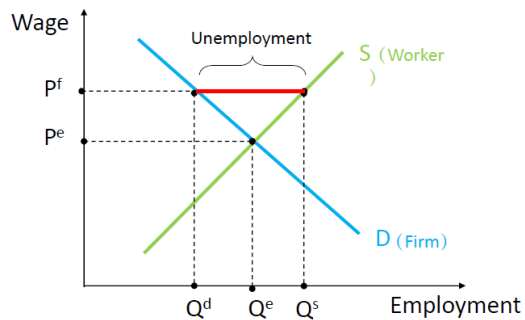
Minimum wage may lead to increase in unemployment.

Price Floor (2)：Agricultural Price Supports
•To maintain the high (relative to equilibrium) price, the government need to purchase the surplus production
•Government expenditure = $P^f*(Q^s-Q^d)$
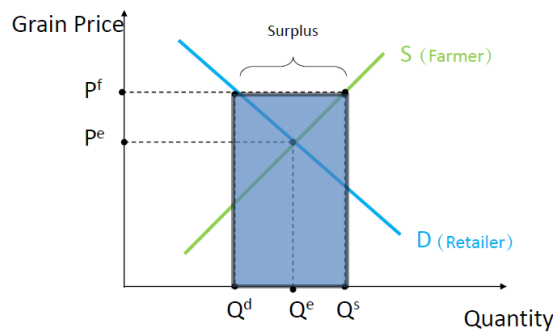
➢ Comparative Static Analysis

•Comparative static analysis shows how the equilibrium price and quantity will change when a determinant of supply or demand changes.
（案例：房地产政策分析）

Chapter 4 Elasticity and Applications

◆ Demand Elasticity

➢ Own Price Elasticity

• Elasticity is a measure of how responsive quantity demanded is to changes in environmental variables.

• For own price elasticity, the environmental variable is product price.

$$E^d = \frac{\%\Delta Q}{\%\Delta P} = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Point Elasticity	**Arc Elasticity**
$E = \dfrac{(Q_2-Q_1)/Q_1}{(P_2-P_1)/P_1}$ $= \dfrac{(160-240)/240}{(110-90)/90}$ $= -1.5$	$E = \dfrac{(Q_2-Q_1)/(\frac{Q_1+Q_2}{2})}{(P_2-P_1)/(\frac{P_1+P_2}{2})}$ $= \dfrac{(160-240)/(\frac{160+240}{2})}{(110-90)/(\frac{110+90}{2})}$ $= -2$
A to B and B to A have different elasticities	A to B and B to A have the same elasticity
Good for deriving the properties and formulas	Good for practical calculation

Remark : Own price elasticity is always negative – Due to "law of demand": P↑ → Q↓

Price Elasticity	Demand for Product is
|E|>1	Elastic
|E|=1	Unit Elasticity
|E|<1	Inelastic

➢ Own-Price Elasticity and Total Revenue

• Total revenue：R = P x Q

ΔR = (P+ ΔP)(Q+ ΔQ) – PQ= ΔP×Q+ ΔQ×P + ΔP ×ΔQ≈ΔP×Q+ ΔQ×P

％ΔR = ΔR /R =ΔP/P+ ΔQ/Q= ％ΔP + ％ΔQ= ΔP/P(1+E)

• If demand is elastic, i.e., E<-1,   P↓ →R↑ (Q↑ → R↑, MR>0)

• If demand is inelastic, i.e., -1<E<0 ,   P↓ → R↓ (Q↑ → R ↓, MR<0)
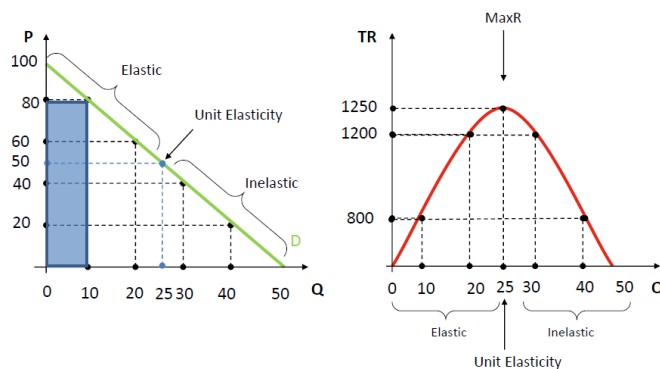
➢ Factors Affecting Own Price Elasticity

• Available Substitutes

– The more substitutes available for the good, the more elastic the demand.

• Time Horizon

– Demand tends to be more inelastic in the short term than in the long term.

– Time allows consumers to seek out available substitutes.

• Expenditure Share

– Goods that comprise a small share of consumer's budgets tend to be more inelastic than goods for which consumers spend a large portion of their incomes.

➢ **Special Cases**

Perfectly Elastic ($E_{QX,PX}=-\infty$)   Perfectly Inelastic ($E_{QX,PX}=0$)
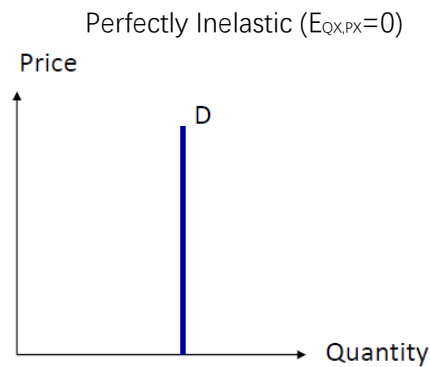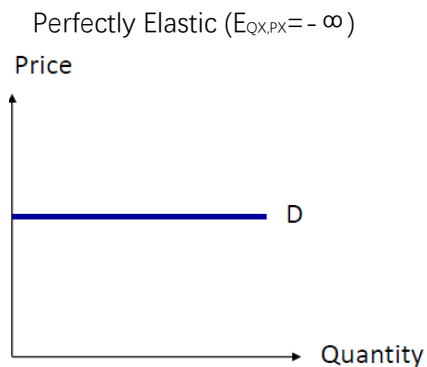
➢ **Cross Price Elasticity**

• Cross Price Elasticity measures how responsive quantity demanded for a good/service is to changes in price of another good/service.

$$E_{Q_x,P_y} = \frac{\%\Delta Q_x^d}{\%\Delta P_y} = \frac{\Delta Q_x^d}{\Delta P_y} \cdot \frac{P_y}{Q_x^d}$$

Cross Price Elasticity	Relationship between x and y
$E_{Qx,Py} > 0$	Substitutes
$E_{Qx,Py} < 0$	Complements
$E_{Qx,Py} = 0$	Unrelated

（案例：燕麦市场 Effects of Other Firms' Marketing Strategies；Effects among Own Brands）

◆ **Supply Elasticity**

➢ **Own Price Elasticity of Supply**

• Measures how responsive quantity supplied of a good/service is to changes in its own price.

$$E^s = \frac{\%\Delta Q^s}{\%\Delta P} = \frac{\Delta Q^s/Q^s}{\Delta P/P} = \frac{\Delta Q^s}{\Delta P} \cdot \frac{P}{Q^s}$$

	Supply is
$E^s > 1$	Elastic
$E^s = 1$	Unit elastic
$E^s < 1$	Inelastic

➢ **Factors Affecting Supply Elasticity**

1. Cost increased associated with output expansion.

–Eg: Surplus production capacity; Extra Stocking

2. Time span: ability to adjust production capacity

➢ Special Cases

Perfectly inelastic supply: $E^s=0$

•Quantity supplied does not response to price

–Eg1：Supply in the short-run

–Eg2：Arts, Gasoline in the long-run

◆ Applications

➢ Application 1: Fluctuations in Oil Price

原油需求价格弹性过低，使得价格波频繁且幅度大

➢ Application 2: Burden of Taxation

• Price increase P0→P1

• Consumer Price(P1):

Actual price paid by consumer in order to obtain each unit of commodity

• Producer Price (P_{sel}):

Price received by the firm from selling each unit of commodity

•Tax revenue of the government：$R=t*Q1=(P1-P_{sel})*Q1$

• Burden of the consumers：P1-P0

• Burden of producers：$P0-P_{sel}$
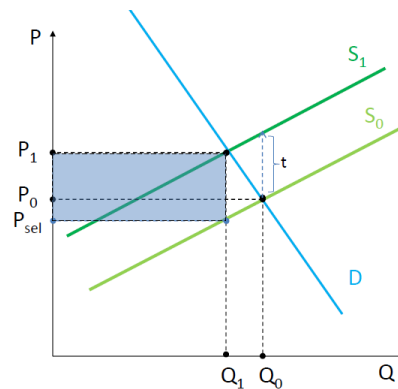
• When supply is more elastic than demand：$P1-P0> P0-P_{sel}$
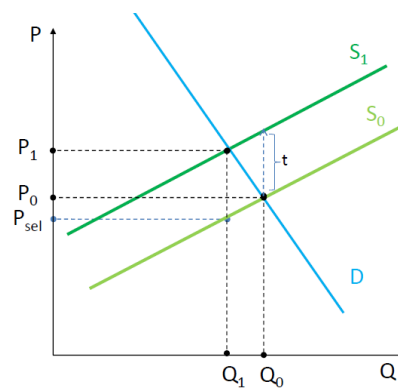
• When demand is more elastic than supply：$P1-P0< P0-P_{sel}$
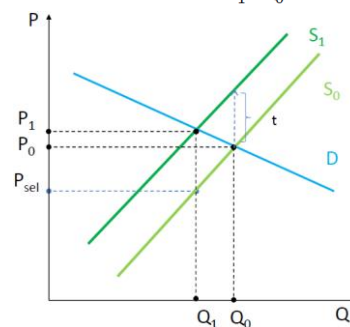
➢ Applications of Elasticities

- A unit-free measure of price sensitivity of demand
- Effects of price reduction on revenue
- Pricing decisions on different products within the same firm
- Fluctuations in prices over time
- Burden of taxation
- Other examples in Ch. 4B

Chapter 5 Theory of Production

•What is behind the supply curve?

–Behavior of producers----theory of production

•Production: the process of transforming inputs into outputs.

➢ Production Function

•Production function: the maximum output that can be produced given a certain quantity of inputs.

•Focus on one particular output: how much can be produced given a certain quantity of inputs?

•For example, Y=F(L,K)

–Y: Output (e.g., rice)

–L: Labor

–K: Capital

–F(.,.) : Production function linking inputs to outputs

•Often we want to know how output changes as one input changes. In answering this question, we need to hold other inputs constant.

–Y=F(L,K) or Y = F(L)

➢ Production curve

•Average Product : AP = Y/L

•Marginal Product : MP=ΔY/ΔL= Y'(L) as ΔL→0

# Worker (L)	Total Production (TP,Y)	Average Production (AP)	Marginal Production （MP）
1	1	1	1
2	3	1.5	2
3	6	2	3
4	10	2.5	4
5	13	2.6	3
6	15	2.5	2
7	16	2.3	1
8	16	2	0
9	15	1.7	-1
10	13	1.3	-2
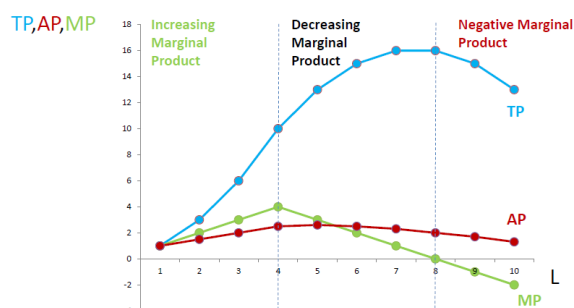
Remarks:
1. Trend of TP
2. Trend of MP: 3 regions
3. Trend of AP
4. MP and AP

MP pass AP at AP's maximum point

• When MP>AP, L↑ => AP↑
• When MP<AP, L↑ => AP↓
• When MP=AP, AP reaches its maximum

➢ The Law of Diminishing Returns

•The law of diminishing returns: as one input increases (holding other inputs constant), its marginal output decreases.

•The key here is that other inputs are held constant.

•The law holds as a general principle, not necessarily on every point.

➢ Short-run vs Long-run

•The short run is a period of time in which the quantity of at least one input is fixed and the quantities of the other inputs can be varied.

•The long run is a period of time in which the quantities of all inputs can be varied.

•The short run and long run distinction varies from one industry to another.

➢ Returns to Scale

•Returns to scale refer to how output responds when all inputs are varied in the same proportion.

i.e., when the entire "scale" of operation is increased or decreased proportionally.

	$Q^*=F(L,K)$	Example Industries
Increasing Return to Scale	$F(2L,2K)>2Q^*$	Many manufacturing processes enjoy modestly increasing returns to scale for plants up to the largest size used today
Constant Return to Scale	$F(2L,2K)=2Q^*$	Handicraft industries (such as haircutting in America or handloom operation in a developing country)
Decreasing Return to Scale	$F(2L,2K)<2Q^*$	Productive activities involving natural resources such as growing wine grapes or providing clean drinking water to a city

Chapter 6 Analysis of Costs

➢ **Cost curve**

•Fixed Cost (FC): Expenses that must be paid even if the firm produces zero output

•Variable Cost (VC): Costs that vary as output changes

•Total Cost (TC): TC=FC+VC

L	TP	FC	VC	TC
0	0	10	0	10
1	1	10	10	20
2	3	10	20	30
3	6	10	30	40
4	10	10	40	50
5	13	10	50	60
6	15	10	60	70
7	16	10	70	80
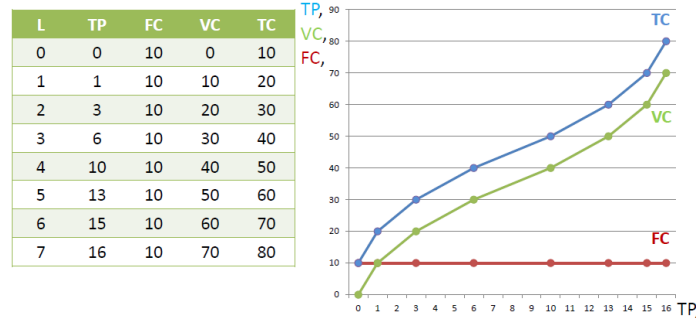
•Average Fixed Cost (AFC) = FC/TP

•Average Variable Cost (AVC) = VC/TP

•Average Total Cost (ATC) = ATC/TP = AFC + AVC

•Marginal Cost (MC) = ΔVC/ΔTP

L	TP	AFC	AVC	ATC	MC
1	1	10	10	20	10
2	3	3.3	6.7	10.	5
3	6	1.7	5.0	6.7	3.3
4	10	1	4	5	2.5
5	13	0.8	3.8	4.6	3.3
6	15	0.7	4.0	4.7	5
7	16	0.6	4.4	5	10
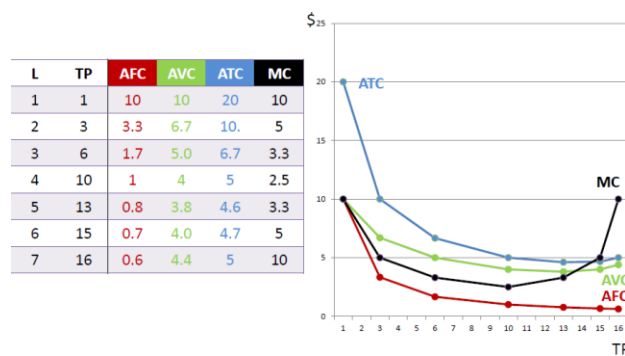
•A more smooth and general graph

•Trends in different cost curves (U-shaped)

MC and ATC/AVC

•MC cross AVC at AVC's minimum point

•MC cross ATC at ATC's minimum point
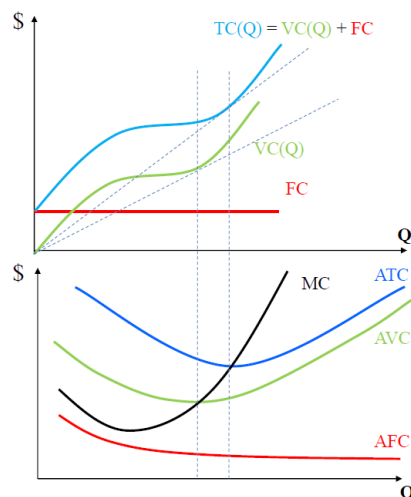
➢ **Link between Production and Cost**

1.Production Function: TP = F(K,L)

•K: Fixed (capital, such as machine and factory)

•L: Variable (labor input)

2.Factor Price: wage for labor (w)

$$MP \cdot MC = \frac{\Delta Q}{\Delta L} \cdot \frac{\Delta C}{\Delta Q}$$
$$= \frac{\Delta C}{\Delta L} = w$$

•MP's maximum point corresponds to MC's minimum point:

–Q⋆: output level at MC's minimum

–L⋆: labor input level at MP's maximum

–Q⋆=F(K,L⋆)

•Diminishing returns to variable factor implies an increasing short-run marginal cost
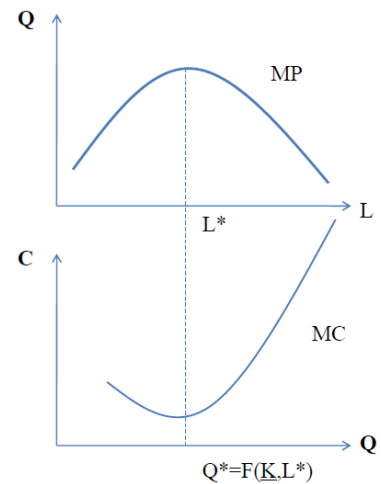
> ## Short-run vs Long-run
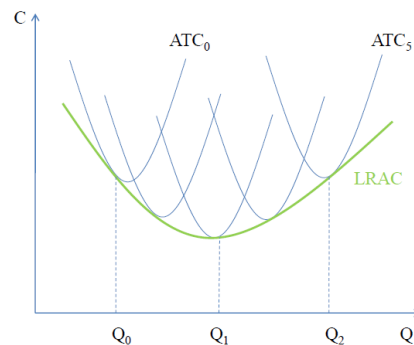
> ## Economies of Scale

•Increasing returns to scale

• Average cost decreases with the scale of the production

•Source:

–Fixed capital;

–Bulk buying of materials through long-term contract (Finance);

–Specialization of managers;

–Marketing: Spreading the cost of advertising over a greater range of output in media markets;

–Learning by doing

•Limits

–Exceeding nearby raw material supply

–Saturating local market
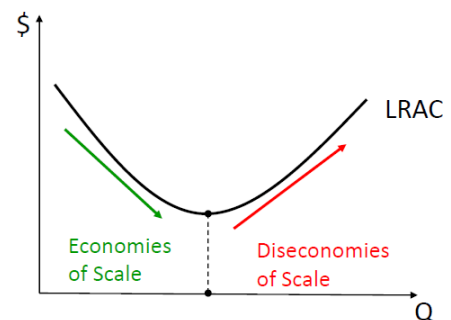
Chapter 7 Analysis of Perfectly Competitive Market

◆ Supply Behavior of the Competitive Firm

➤ Features of a Perfectly Competition Market

1. There are many sellers/firms (and buyers). They are "small" relative to the market.
2. Every firm produces homogenous (identical) product
3. Perfect information (Prices and quality of products are assumed to be known to all consumers and producers)
4. No transaction cost
5. Free entry and exit
（案例：农村集市，中关村）
Unrealistic?
• Many small business are actually "price taker". Their similar rule are closed to those in the perfectly competitive market.
• The perfectly competitive is a "Benchmark" model of studying the market competition
– For welfare analysis: Once we understand the market efficiency, we can then understand the importance of restricting market power
– For managers: A price-taking firm can only maintain a minimum level of profit (product differentiation)

➤ Demand Curve Faced by a Perfectly Competitive Firm

• The perfect competitive firm (price taker) faces a completely horizontal demand (or dd) curve
– A perfectly elastic demand curve
– Hypothetically, if the firm manage to sell the product a price lower than the competitive level (P_e), then it can take over the whole market
– If the firm increase the price by a little bit, it will lose all its business
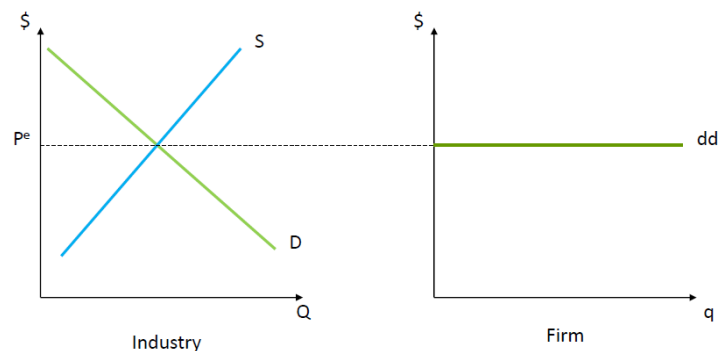
Objective of the Firm——Profit Maximization
– Firms maximize profits because that maximizes the economic benefit to the owners of the firm
– Profit maximization requires the firm
• To choose the optimal level of input and output

• Make sure the output is produced efficiently (prevent waste, encourage worker morale, etc)

➢ Output Decision (Short-run)

• Review of the total cost curve
• Total Revenue: TR=P×q
• Marginal Revenue (MR): Change in revenue that is generated by an additional unit of sales
• For a price taking firm, MR=P
• Profit = TR-TC. For a given output, the vertical difference between R and TC is the profit
• Decision process in firm output
  • As long as MR>MC, increase in output leads to increase in profit
  • As output increases, MR stays the same; MC increases
  • When q=q∗, MR=MC, profit is maximized
  • With further increase in output, MR<MC, which decreases the profit
• Optimal Decision Rule: MC=MR=P
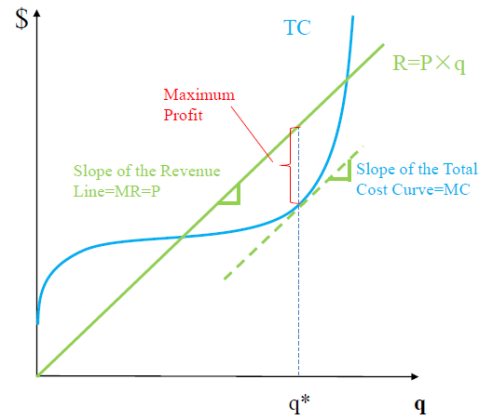
Cost Curves and Firm Profit   Zero-profit point
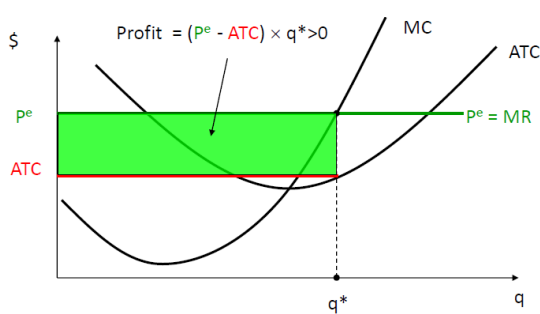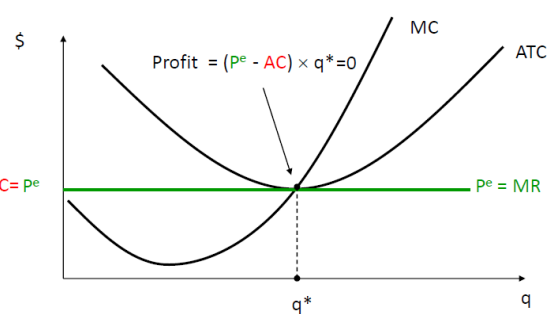
Loss Minimization
• If the firm continue to operate, it will suffer a loss of area A
• What is the firm's fixed cost? FC = (AC-AVC)·q
• If the firm shut down, it will suffer a loss of area B=fixed cost
• A<B: The firms should continue to operate in order to minimize its loss
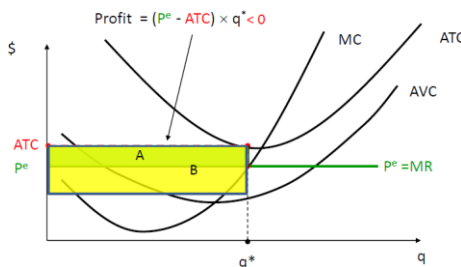
➢ Shutdown Point

• The shutdown point comes where revenue just cover variable costs or where losses are equal to fixed cost
• Shutdown Rule: when price fall below average variable costs, the firm will maximize profits (minimizes its loss) by shutting down

Firm's Supply Curve

A firm's supply curve travels down the MC curve to the shutdown point (minimum AVC)

◆ Supply Behavior in Competitive Industries

Market Supply

• Total quantity brought to market at a given price will be the sum of the individual quantities that all firms supply at that price.
Aside: From Individual to Market Demand
• Market demand is the sum of individual demand at any given price
由图可知，个人的需求价格弹性和单个企业的供给价格弹性小于市场的需求/供给价格弹性。

Short-run and Long-run Equilibrium

• Short-run equilibrium: Output changes must use the same fixed amount of capital
– Fixed cost cannot be easily adjusted in the short-run
– Firm can adjust other factor input such as labor in order to change its output level
• Long-run equilibrium: Capital and all other factors are variable and there is free entry and exit of firms into and from the industry.

Effects of a Positive Demand Shock
• Short-run positive profits induce more firms to enter
• Firms' entry lead to

1. Increase in total supply
2. Decrease in equilibrium price
3. Decrease in individual firm's demand curve
4. Decrease in profit (despite of the profit-maximization level decisions)
• No further entry when each individual firm in the market make zero profits
Zero-profit long-run equilibrium:
P = MC = minimum long-run AC = zero-profit price

➢ **"Price Takers" in Competitive Markets**

• Firms in perfect competitive markets are "price taker"
– The long-run equilibrium price is the lowest point of the average cost curve (due to free entry)
– It is determined by production technology
• Firms in perfect competitive market do not have "power" to choose their prices
• By contrast, firms in non-competitive market (say monopoly) has "market power" , which is a power to choose their prices.

◆ Special Cases of Competitive Market

➢ **Constant Cost**

• Production can be expanded by duplicating factor inputs (e.g. textile)
• Long-run supply curve is a horizontal line
• Perfectly elastic
• Increase in demand only increases the quantity, leaving the price unchanged
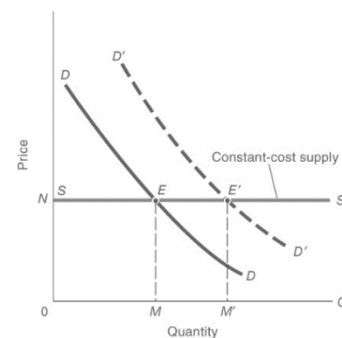
➢ **Fixed Supply**

• Some goods or productive factors are completely fixe in amount, regardless of price.
• E.g., painting, natural Resources (Land), etc
• When supply is independent of price
– The supply curve is a vertical line
– Perfectly inelastic
– Increase in demand leads to increase in price, but not quantity
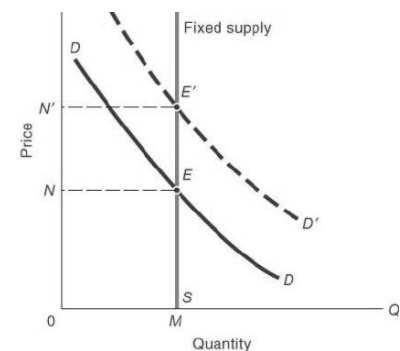
➢ **Backward-Bending Supply Curve**

• Objective: maximize utility from consumption and leisure
• Constraint: time (24 hrs)
• Decision: allocate time between working and leisure
– Benefit of working: increase consumption at wage rate
– Cost of leisure: wage rate
• As wage rate increases
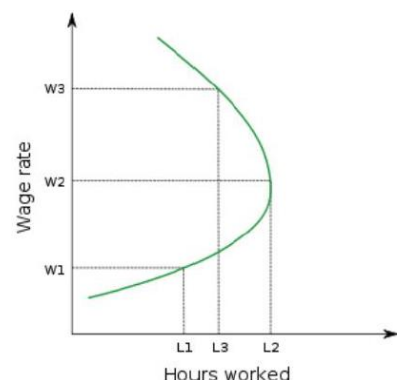
– Substitution effect: leisure becomes relatively more expensive → consume less leisure → increase working hours

– Income effect: leisure (as a normal goods) should increase as income increases → decrease working hours

• W1 → W2: Substitution effect> Income effect

• W2 → W3: Income effect> Substitution effect

◆ Efficiency vs Equality

➤ Concept of Efficiency

Pareto efficiency

Pareto efficiency (or sometimes just efficiency) occurs when no possible reorganization of production or distribution can make anyone better off without making someone else worse off.

➤ Price and Trade

• Market is a location where trade takes place

• Why to trade?

– Evaluation for the same commodity are different across individuals

– Proper transfer in ownership can raise social surplus

• The role played by the PRICE

– Make trading possible

– Split the Consumer Surplus (CS) and the Producer Surplus (PS)

– Does NOT affect the social surplus gains from the trading

➤ Market

• Why do we need a MARKET?

– Reduce transaction/trading cost (search, transportation, etc)

– Improve the matching between buyers and sellers, therefore improve efficiency

• The role played by the PRICE

– "Invisible hand"

➤ The Two Important Decisions

• Production

– What to produce?

– How many?

– How to produce?

• Consumption

– How to distribute products among members in the society?

– What are the principles of allocation?

➤ **Efficiency of Competitive Market**

• Consumer surplus: BPE

• Producer surplus: PAE (profits + rents)

• Economic surplus: welfare or net utility gain from production and consumption of a good (BAE = BPE+PAE)

• Competitive equilibrium (point E) maximize the economic surplus

– P=MU consumer surplus is maximized

– P=MC producer surplus is maximized

– MU=MC economic
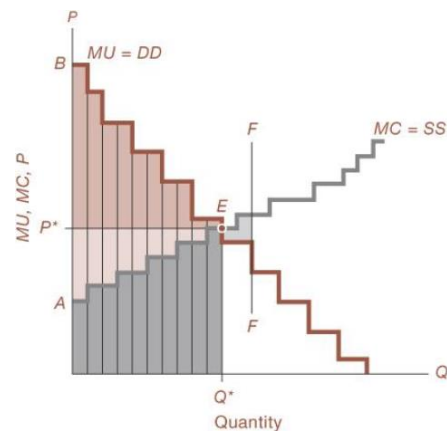
➤ **Efficiency vs Equality**

• Problems of a purely equality-driven society

– Hard-working people cannot obtain the full returns → no incentive to exert effort

– Everyone remains equal, but equally poor

• Problems of a purely efficiency-driven society

– In reality, everyone is not born equally: family background, ability, etc

– Some are very poor thought no fault of their own, while others are very rich through no virtue of their own

– Concerns on humanity

– May jeopardize the social stability, which in turns endanger the efficiency

• Role of the government: Find an optimal balance between the two for a sustainable growth with a harmony society

➤ **Market Failures**

• Imperfect Competition

– Monopoly and Oligopoly

• Externalities

– Negative: Pollution

– Positive: Vaccines

• Imperfect Information

Chapter 8&9 Imperfect Competition

◆ Patterns of Imperfect Competition

➢ Definition of Imperfect Competition

•Imperfect Competition prevails in an industry whenever individual sellers can affect the price of their output.

➢ Alternative Market Structures

Textbook Table 9-1

➢ Sources of Market Power
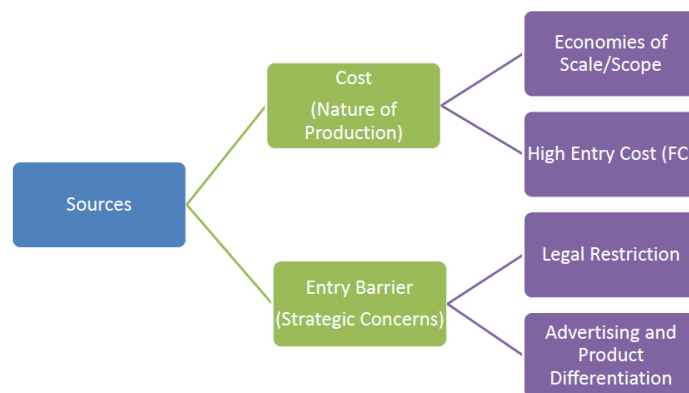
Market Structure Depends on Relative Cost and Demand Factors
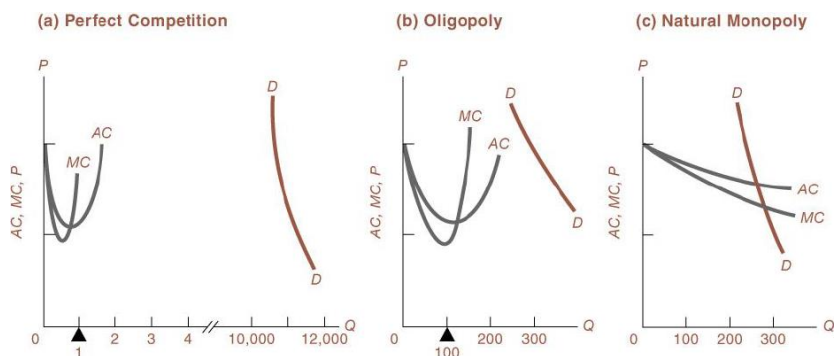
•Increasing Return to Scale (IRS): Average cost decreases as firm increases output
•Natural Monopoly :Industry's output can be efficiently produced only by a single firm
–With perfect IRS, average and marginal cost fall forever
–Either because large FC, or strong network effects

➢ Economies of Scope

•Means a number of different product can be produced more efficiently (cost effectively) together than apart
•An important source of "market power"

➢ **Legal Restrictions**

•Patent: grant to an inventor to allow temporary exclusive use (or monopoly) of the product or process that is patented
•Purpose
–Protect incentive for innovation
–But we have to realize that having patent does not always mean that your product is immune from competition

◆ **Monopoly Behavior**

➢ **Demand, MR, Elasticity, and TR**
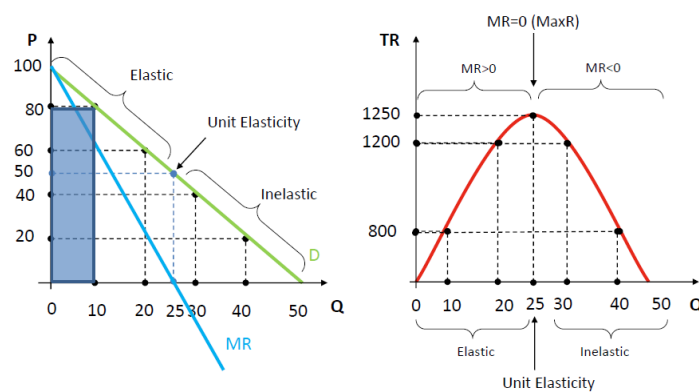
➢ **Output and Pricing Decisions of Monopoly**

•Output Rule: Produce at Q^m such that $MR(Q^M) = MC(Q^M)$
•Pricing Rule: Find the corresponding price along the demand curve at Q^M $P^M = P(Q^M)$
•Monopoly firm does not have a "supply curve"
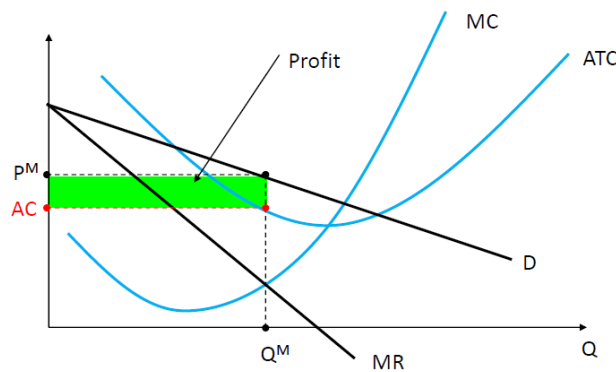
•Since Monopoly is not a price-taker anymore, the slope of the tangent line changes across production levels
•Monopoly profit is maximized when MR=MC at $Q=Q^M$
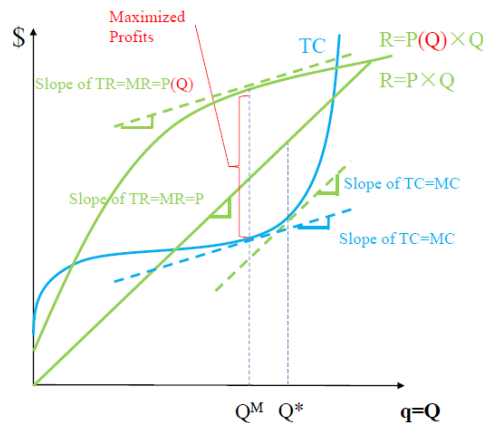
◆ Competition among the Few

➢ Market Power and Its Measure

•Market power: the degree of control that a single firm or a small number of firms have over the price and production decisions in an industry
•Measures
1.Concentration ratios
2.Herfindahl-HischmanIndex (HHI)

➢ Four-firm Concentration Ratio

•Sum of the market shares of the four largest firms in the industry: C4 = S1+S2+S3+S4, where Si are firm i's market share
•0 ≤ C4≤ 1
–C4 → 0: Many firms in the market; high degree of competition; Low market power
–C4→ 1: Only a few sellers in the market; low degree of competition; High market power

➢ Herfindahl-Hischman Index

•HHI = sum of the squared market share of all firms in the market ×10000
•HHI = 10000 ×ΣSi2
•0≤HHI≤10000
–In case of monopoly, HHI=10000
–In case of infinite number of small firms, HHI=0

➢ Horizontal Merger Guidelines of the US

•Block a horizontal merger if it will increase the Herfindahl-Hirschman index (HHI) by more than 100
•HHI>1,800 => "highly concentrated"
•HHI<1,000 after a merger => "unconcentrated"
–horizontal mergers usually are allowed
•1000<HHI<1800, depend on other factors in determining whether to block a horizontal merger
–such as economies of scale

–ease of entry into an industry

To Address Anti-trust Concerns（如何说服法庭，证明合并有利）

•Cost Saving
–Economy of Scales
•Special Arrangement to Limit Market Power
•Geography and Market Definition
–Global vs Domestic market

➢ Country, State, and County Level Concentration Ratio

•When the relevant market is "local", using national level concentration measures will <u>lower</u> estimate the market powers that matter to the consumers
•In case of US banking industry, using the national level concentration will lead to a complete different conclusion in evaluating the effect of RN act in 1994
–National level: market power increase significantly
–County level: little changes in the local market structure

➢ Three Cases of the Imperfect Competition

➢ Case 1: Monopolistic Competition

•Conditions for monopolistic competition:
1. There are many buyers and sellers;
2. There is free entry into and exit from the industry;
3. Firms take other firms' prices as given;
4. Each firm in the industry produces a differentiate product
   • Each firm faces a downward sloping demand curve
   • Consumers view differentiated products as close substitutes: there exists some willingness to substitute

Managing a Monopolistically Competitive Firm
•Like a monopoly, monopolistically competitive firms
–have market power that permits pricing above marginal cost
–level of sales depends on the price it sets
•But …
–The presence of other brands in the market makes the demand for your brand more elastic than if you were a monopolist
–Free entry and exit impacts profitability
•Therefore, monopolistically competitive firms have limited market power.

Short-Run Monopolistic Competition
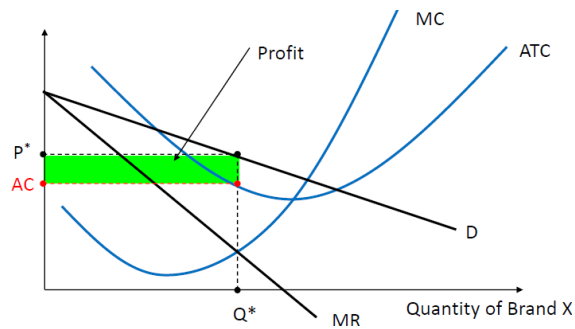
Long-Run Monopolistic Competition

•With free entry, in the long-run:

Other "greedy capitalists" enter, and their new brands steal market share.

This reduces the demand for your product until profits are ultimately zero (price isabove the marginal cost)
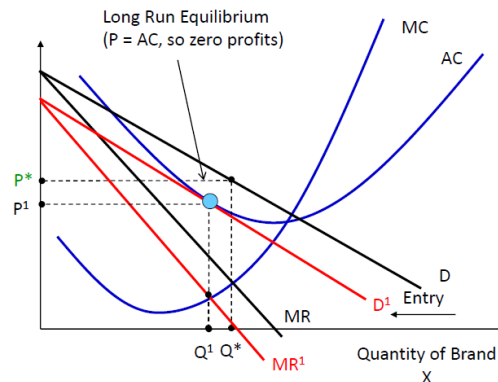
•Zero economic profit happened when demand curve (D) and average cost curve (ATC) intersect at the quantity (Q^M) determined by MR = MC

•One feature that is not obvious: in the above situation, D will be tangent with ATC at the Q^M

•The figure below prove this feature by contradiction

–When D cross ATC twice as the figure show, firm can make positive profits by choosing a Q higher than

–This violates the fact that is the profit-maximizing output level
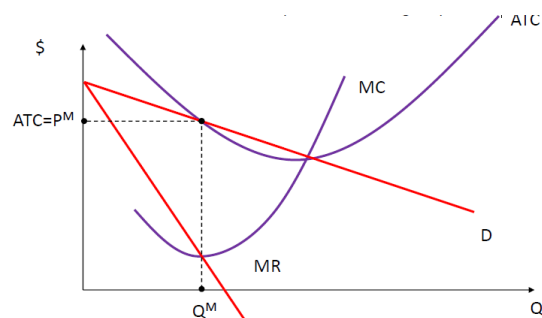
•Another way of understanding the above feature is to recognize the potential link between MR and P, and AC and MC

$$MC = \frac{\partial C}{\partial Q} = \frac{\partial(AC \cdot Q)}{\partial Q} = \frac{\partial AC}{\partial Q} \cdot Q + AC$$

$$MR = \frac{\partial R}{\partial Q} = \frac{\partial(P(Q) \cdot Q)}{\partial Q} = \frac{\partial P(Q)}{\partial Q} \cdot Q + P$$

•Given this, if any two of the facts below is true, then the rest one will be true as well

1.MR = MC (Profit maximization)

2.AC = P (Zero profit)

3.$\partial AC/\partial Q = \partial P/ \partial Q$ (Average cost curve tangent with the demand curve)

➢ Case 2. Rivalry among the Few

•Entry barriers exist, at least in the short-run. Thereby only a few firms compete with each other (e.g., Duopoly-2 firms compete)

•Firms are interdependent.

•Strategic interaction: occurs when each firm's business depends upon the behavior of its rivals

•Analytical tool of the strategic interactions among firms: Game Theory

➢ Case 3. Collusive Oligopoly

•Collusion: A situation in which two or more firms jointly set their prices or outputs, divide the market among themselves, or make other business decisions jointly

•Cartel: An organization of independent firms, producing similar products, that work together to raise prices and restrict output
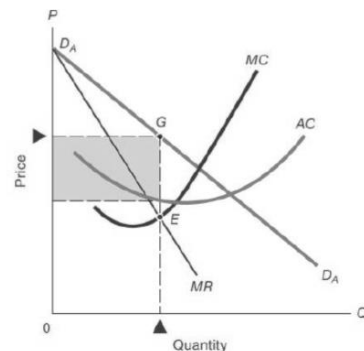
FIGURE 10-2. Collusive Oligopoly Looks Much Like Monopoly

◆ Pricing Strategy

•When firms have market power, they are price-maker. With more information on the willingness to pay of consumers, they can extract more profits through various forms of price discrimination

•Price discrimination: same product is sold to different consumers for different prices

➢ A Simple Formula

•Suppose that a product's own price elasticity is E = -%ΔQ / %ΔP = -(ΔQ/ΔP)·(P/ Q)

•And MR = ΔR/ΔQ ≈ (ΔQ·P + ΔP·Q)/ΔQ = P[1 –1/E] = P[E –1]/E

•Optimality requires MR = MC. Hence P = [E/(E-1)] * MC.

•Optimal price is marginal cost multiplied by a constant

•This constant K=E/(E-1) is called markup factor

–More elastic demand -> 减少 markup factor

–Less elastic demand -> 增加 markup factor

–Higher marginal cost -> 无影响 markup factor

➢ Example 1: Discounting

•Similar examples: discount to senior people, family buyers (relative to enterprise buyers)

•People might think such a pricing strategy is designed for the benefits of these groups; however, it is actually for the purpose of profit maximization

•Students, seniors, family buyers are more sensitive to prices (elastic demand), therefore lowering price will increase firm's revenue

➤ Example 2: Different price by locations

Caveat: if the price difference is due to the difference in production or transportation costs, then it is not evidence of price discrimination

➤ Example 3: Different prices by amount of purchase

Chapter 10 Game Theory

Game theory analyzes the ways in which two or more players choose strategies that jointly affect each other.

Remark: outcome : (___,___)里面要填 payoff；equilibrium/解 : (___,___)里面要填 strategy!

◆ Principle 1：Choose Your Dominant Strategy

• Dominant Strategy: a strategy that gives a player the highest payoff no matter what strategy the other player follows.

➢ Nash Equilibrium:

no player can gain anything by changing his own strategy, given the other player's strategy.
Remarks on "Equilibrium"：
1. In Economics, Equilibrium is a stable outcome.
2. It is a theoretical outcome predicted by game theory. (based on the rationality assumption)
3. Optimal decisions for each player may NOT lead to optimal outcomes for the group.

➢ Cooperative Solution

• In prisoner's dilemma, the Nash Equilibrium (NE) is not the "optimal" solution.
• Compared to the NE, (Silent, Silent) is a better outcome for both individuals and the group as a whole.
• To achieve such an outcome requires cooperation from both players.
--- "cooperative solution"
• However, being cooperative is hard.
– Each player have strong incentives to defect, given the other player's strategy being "cooperative" (silent).
– In theory, "cooperative solution" is not a NE, therefore is not stable.

◆ Principle 2： Put Yourself in the Position of Your Opponent

(best response)

• If your opponent has a dominant strategy, you can expect that will be his/her action since it is his/her best interest to do so.
• The seemingly "strong" party (in ability/resource) may have
its weak point
– Its loses are larger if not acting.

➢ Analysis of the Price War

➢ Possibility of Collusion?

• Obviously, firms can gain larger profits than Nash outcome they are able
to collude and sustain a high price level.
• However, such a collusion is not stable, because both firms have incentive

to deviate from the collusion contract.

➢ How to Avoid the Price Wars?

• A vital point: Lack of Core Technologies

• Similar core technology and minor innovations leads to homogenous products, which in turns lead to severe competition, driving firms' economic profits down to zero.

• A possible solution: Increase R&D, increase product differentiation, increase consumer loyalty.

其他方法不可行：

• A shake-up in the industry (weak firm exit, or acquired by the winner)?

– Consolidation did not happen

– Nobody is winning during the price war

– Local governments are not willing to let weaker companies fold

• Access to international market?

– More feasible after entering WTO in 2001

– Warning: anti-dumping cases

Chapter 11 Uncertainty, Insurance, and Information

◆ Concepts Regarding "Risk"

➢ Risk Aversion:

Preferring a sure amount of $0.92M to a risky prospect with and expected value of $0.92M

➢ Risk Aversion with Marginal Utility of Income

• In Economics terms, risk averse consumers obtain higher level of pleasure (utility) under a certain outcome relative to the uncertain outcome, even if they have the same expected value

• Risk-aversion is the same as diminishing marginal utility of income:

– Compare (1) a certain outcome of w, with

(2) an uncertain outcome with equal probability of w+1 and w-1

– Diminishing marginal utility of income implies that the pain from losing $1 is greater in magnitude than the pleasure from gaining $1

– With equal probability, the consumer will be worse off moving from (1) to (2)

$E[u(w)] = 0.5 \times u(w-1) + 0.5 \times u(w+1)$
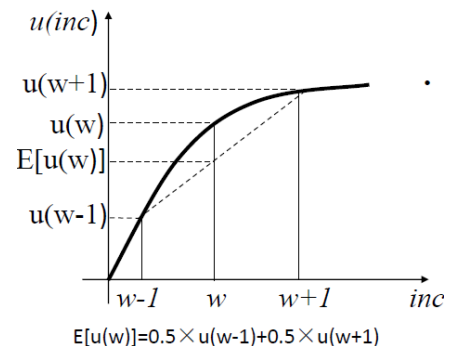
➢ Certainty Equivalent

• Certainty Equivalent (CE): A certain payoff level at which the consumer obtains the same level of utility/pleasure as he would obtain facing a given uncertain outcomes

• Apparently, if CE<E(w), then consumer is risk averse

• 消费者面临财富的不确定性（Uncertainty）：
– 基于财富值的效用函数（Utility）：U(x)
– 财富的期望值（Expected Wealth）：$E(W) = (1-p) \cdot W0 + p \cdot (W0-L)$
– 财富效用的期望值（Expected Utility of Wealth）：$E[U(W)] = (1-p) \cdot U(W0) + p \cdot U(W0-L)$
– 期望财富的效用值（Utility of Expected Wealth）：$U[E(W)] = U[(1-p) \cdot W0 + p \cdot (W0-L)]$
– 确定性等值（Certainty Equivalent）：$U(W_{CE}) = U[E(W)]$
– 风险厌恶(Risk Aversion)：$U[E(W)] > E[U(W)]$，也等同于 $W_{CE} < E(W)$

◆ Insurance

➢ Insurance

• Source of insurance company's profit
– Purchasing insurance is purchasing certainty
– Uncertainty causes risk averse consumer in their utility/pleasure

– In order to avoid this loss, consumers are willing to pay a price in order to go back to certainty

• The maximum possible of the insurance premium is the difference between the certain wealth and the certainty equivalence of the uncertain outcome: $I_{max} = w - CE$

➢ **Insurance Company**

• Expected profit of the company: $E(\pi)=I\times(1-p) + (I-L)\times p=I-p\times L$

• Assume that insurance company is risk neutral. It only cares about its expected profit.

• In order to stay profitable, the insurance premium should make $E(\pi)\geqslant 0$.

◆ Asymmetric Information

• Asymmetric Information occurs when buyers and sellers have different information on important facts

• Hidden characteristics: Things one party to a transaction knows about itself but which are unknown by the other party.

• Hidden action: Action taken by one party in a relationship that cannot be observed by the other party.

➢ **Adverse Selection**

• Refers to a situation where a selection process results in a pool of individuals with economically undesirable characteristics.

• "Adverse Selection" always happen when asymmetric information exists before agents signing the contract.

（案例：二手车市场，保险市场）

➢ **Solution: Signaling**

• Signaling: An attempt by an informed party to send an observable indicator of his or her hidden characteristics to an uninformed party

– signal/records/certificates

• The signal need to be credible:

– more costly (or impossible) for the low type to send

– Otherwise the low type can mimic the same signal as the high type

（案例：学位证书，长期记录）

➢ **Moral Hazard**

• Situation where one party to a contract takes a hidden action that benefits him or her at the expense of another party

• The nature of insurance markets makes insurance companies particularly vulnerable to the moral hazard problem

• Insurance policy may change people's incentives, which in turns changes the probability of the events covered by insurance

（案例：医疗市场，滥用抗生素）

➢ **Solutions**

• Deductible (If the deductible is $200, the first $200 in losses is paid by the insured)

• Risk sharing

– Full insurance is the main cause of moral hazard

– Partial insurance means that the insured need to a certain share of the loss

Chapter 12 Factor Input Demand

◆ Input Demand for Profit-maximizing Firms

➢ Marginal Revenue Product

• Marginal Revenue Product (MRP) of input A is the additional revenue produced by an additional unit of input A
• Calculation: MRP = MP_i × MR

Market Structure	Marginal Revenue (MR)	Marginal Revenue Product (MRP)
Perfect Competition	MR=P	MRP = MP_i × P
Imperfect Competition	MR(q) depends on the specific output level	MRP = MP_i × MR

➢ Input Demand for Profit-maximizing Firms

• As factor input ↑, marginal productivity ↓, eventually MRP_i = Price of factor i when firm's profit is maximized
• For labor, this means that MRP_L = MP_L × MR = wage
Rule: Profit-maximization labor input
Manager should keep hiring labor, until MRP_L=w in the diminishing marginal return region
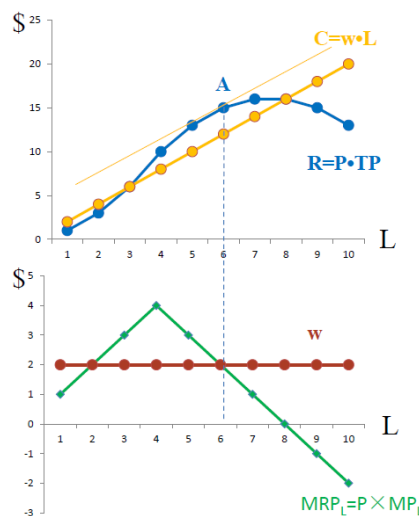
➢ Least Cost Rule

• Profit maximizing problem can be thought as to
1. minimize the cost of producing a given level of output
2. Chose a output level that maximize profit

• Condition of achieving cost minimization: $\dfrac{MP_L}{wage} = \dfrac{MP_K}{interest}$

• This ratio gives us the amount of output being generated if we spend $1 in factor inputs; it does not matter we spend the extra $1 on labor or capital.

Therefore $\dfrac{MP_L}{wage} = \dfrac{MP_K}{interest} = \dfrac{\Delta Q}{\Delta C} = \dfrac{1}{MC}$

Now, we should chose a output level that can maximize profit

–MR=MC

–Therefore $\dfrac{MP_L}{wage} = \dfrac{MP_K}{interest} = \dfrac{1}{MR}$

–This is equivalent with the condition obtained from maximizing profit directly

$MRP_i = MP_i \times MR$ = Price of factor i

> **Two Approaches to Maximize Profits**

Approach 1

Choose factor inputs K, L to maximize profit π

Max π= p·Q(K,L) −rK−wL

Optimization: p·MP_L=w; p·MP_K = r

Approach 2

Step 1.

Given a targeted production level Q, choose inputs K, L to minimize production cost C

Min C=rK+wL given Q = F(K,L)

Optimization: MP_K/r=MP_L/w

Step 2.

Choose production level Q to maximize profit π

Max π = p·Q – C(Q)

Optimization: MR(Q) = MC(Q)

◆ **Substitution among Factor Inputs**

•Optimization requires: $\dfrac{MP_L}{wage} = \dfrac{MP_K}{interest} = \cdots = \dfrac{1}{MR}$

•What if the interest rate increases while wage remain fixed ? $\dfrac{MP_L}{wage} > \dfrac{MP_K}{interest}$

–Keeping the same level of capital use will increase production cost without increase in output

–Reduce the use of capital and use more labor for cost minimization

–$MP_K\uparrow$ and $MP_L\downarrow$ until the above equation is balanced again

•**Substitution Rule**: If the price of one factor rises while other factor prices remain fixed, the firm will profit form substituting more of the other inputs for the more expensive factor.

（同理可知，技术变化使得 MP 改变也会出现替代效应）

◆ **Firm's and Market's Factor Demand**

• The MRP schedule for each input gives the demand schedule of the firm for that input

•As with all demand curves, the competitive market demand curve is the horizontal summation of demand curves of all the firms
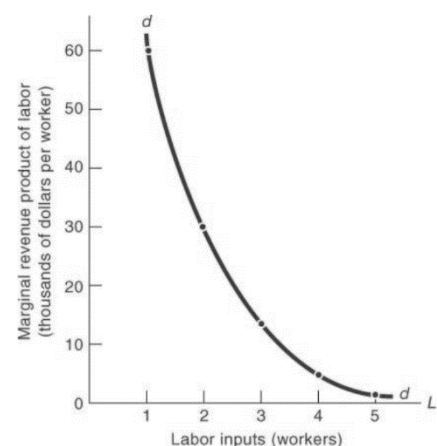
Chapter 14 Natural Resources and the Environment

◆ Resource Categories

	Definition	Example	Management
Nonrenewable	Resources with fixed supply	Fossil fuels, Nonfuel mineral resources (copper, silver, stone, and sand)	Distribution of a finite quantity of the resource over time
Renewable	Resources that are regularly replenished	Solar energy, agriculture land, river water, forests, and fisheries	Sustainable usage. E.g., forest management, protection of fish breeding grounds, regulation of pollution

## ◆ Environmental Economics

➢ Concepts

Externality

•Externality is an activity that imposes involuntary costs or benefits on others, or an activity whose effects are not completely reflected in its market price

•Negative: action by one party imposes a cost on another party (dump waste in a river)

•Positive: action by one party benefits another party (a beautiful garden)

Public Goods

•Public goods: ones whose benefits are indivisibly spread among the entire community, whether or not individuals desire to consume them or not

–An extreme example of externality

–Consumption by one individual does not affect the supply available for other individuals

–Efficient provision requires government involvement

–Examples: knowledge, national defense, lighthouse, public television

•Private goods: ones that can be divided up and provided separately to different individuals, with **no** external benefits or costs to others

–Efficient provision can be achieved through private market mechanism

➢ Market Provision of Goods with Negative Externalities

•Marginal Social Cost (MSC): MC incurred by producers + marginal external cost imposed on others (not taken into account by the producers)

•Socially Efficient Level: MSC=MC→Q*

•Market provision level: Q1>Q*→To much production

•Efficiency loss
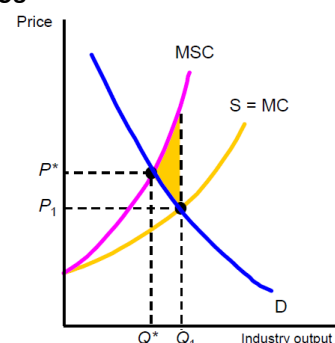
➤ Market Provision of Goods with Positive Externalities

•Marginal Private Benefit (MPB): marginal benefit in pollution reduction enjoyed by the firms
•Marginal Social Benefit (MSB): MPB + external benefits enjoyed by the society
•Socially Efficient Level: MPB=MC→Q∗
•Market provision level: –Q1<Q∗→To little abatement
•Efficiency loss
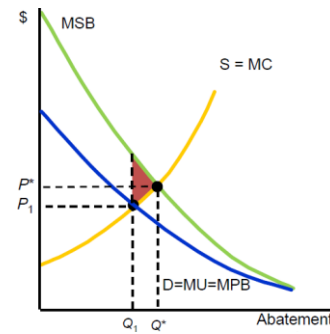
➤ Summary

–Negative externalities → Over provision than optimal
–Positive externalities → Under provision than optimal

➤ Policies to Correct Externalities

Direct control
•Emissions Standard: a legal limit on emissions at E∗
–Enforced by monetary and criminal penalties
–Increases the cost of production and the threshold price to enter the industry
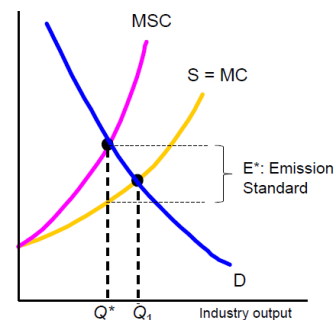
Emission Fee
•Suppose that MSC=MC+E, where E is the social cost of emission
•By charging a emission fee of E, we can restore efficiency
–The new marginal cost curve of the firm (MC') is the same as MSC
–Firm produce at the social efficient level Q∗
–Emission fee internalizes the externality of the pollution
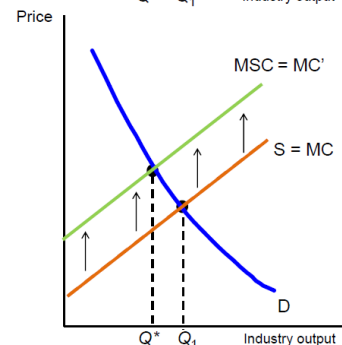
Ensure complete property rights (**Coase Theorem**)
（案例：上游造纸厂和下游景区）
•Insight: if the owners of the two parties can easily bargain with each other, the existence of externalities may not necessarily result in inefficiency
•The efficient result is INDEPENDENT of the specific ownership
If trade of the externality can occur, then bargaining will lead to an efficient outcome no matter how property rights are allocated.

Crucial condition for optimality
(1) well-defined
(2) enforceable property rights
(3) Transaction Cost
    •The practical application of the Coase Theorem depends largely on the number of parties being affected

•When millions of parties are affected (as the case with air pollution in urban areas), it is hard to see how effective negotiation can happen

   –Transaction costs of the negotiation would be far too high

•Government's role in pollution control:

   –Build up legal system to ensure property rights

   –When transaction costs are high, government may intervene on our behalf to deal with the negotiation

Chapter 13&17 Distribution of Income

◆ Wage income determinants

➢ General Wage Level

•Real wage represents the **purchasing power** of an hour's work
–Measure of labor earning
–It's the earning measured by units of certain goods
–Real wage = nominal wage/ price of the goods

➢ Demand for Labor

•Marginal Productivity Difference
–Recall in Chapter 12, optimal labor input is determined by MPL/wage=1/MR=1/P
OR: MPL=wage/P=real wage
–Demand for a factor of production reflects the marginal productivity of that input
•Factors affecting the labor demand (productivity)
–Capital stock
–Technology
–Quality of labor (human-capital: literacy, education, training)

➢ Labor Supply

•Labor supply refers to the number of hours that the population desires to wor in gainful activities
•Labor Supply Curve might be backward bending
•Factors affecting labor supply
1.Labor-force participation
2.Immigration

➢ Labor Market Equilibrium

•Labor's price (wage) and quantities are determined by the interaction of labor supply and demand

◆ Wage Differentials

➢ Difference in People: Labor Productivity

• Difference in capital stock and technology
（案例：美国、墨西哥）

• Difference in human capital
Human capital refers to the stock of useful and valuable skills and knowledge accumulated by people in the process of their education and training
Remark: Education itself may not necessarily increase one's productivity
        People earning college premium may because having a college degree is a signal

of having higher ability, therefore higher productivity

（案例：招工模型，存在信息不对称，隐藏特征，造成逆向选择。适用成本太高

那么，生产性工人要努力向雇主说明自己是真正具有生产能力的。如何去做？

- 面试时衣着讲究？

这可能能够传达出某些信息，但并不直接与生产能力相关（除非是对形象有要求的行业），因此衣着是一个"无关信号"。

- 大声说"我有能力胜任"？

如果这样做就能多获得 5 千元的薪水的话，那么非生产性工人也可以简单地进行模仿而多获得 5 千元薪水，因此这是一个"弱信号"。正因如此，理性的管理者不会关心这些空洞的话，因为每个人都有动力说自己能行。

- 一个强信号一定会满足的条件：给予该信号的成本对于非生产性工人来说比生产性工人高，因此生产性工人更有可能提供这种信号）

High Education as an Ability Signal

- 假设生产性工人具备先天的能力，使得他们容易获得一个大学学位。同时非生产性工人能力较差，使他们难以获得一个大学学位。（或者说他们获得大学学位需要付出很大的代价。）
- 既然非生产性工人难以模仿这个信号，管理这就能够断定有大学学位的工人是具有生产能力的。
- 结果，竞争的压力导致，生产性工人会去获得大学学位，并且获得 1 万元的薪水；非生产工人不能够模仿这个信号，（或者说，不愿意承担所需要的成本）所以信号传递发挥了作用。

➢ Difference in Jobs

- Jobs differ in their attractiveness
- Wage differentials that serve to compensate for the relative attractiveness, or nonmonetary differences, among jobs are called compensating differentials
- Compensating factors:
- Extra long working-hours
- Lonely
- Uncertainty such as irregular employment
- Mortality rate (Statistical value of life)

How to measure the value of life?
- How much people need to be compensated if you want them to take a riskier job?
- For a given period of time (one year): ΔRisk×V = ΔWage
- V= ΔWage / ΔRisk

➢ Difference in People: The "Rents" of Unique Individuals

- Fame can lift income to astronomical level
- These extremely talented people have particular skills that is highly valued in today's economy
- Outside their special field, they might earn but a small fraction of their high income
- Economists refer to the excess of these wages above those of the next best available occupation as a pure economic rent
- Technology improvements have made the economic rent of the unique individuals

increasing over time

– Easier for top individual to serve a larger share of the market

➤ Segmented Markets and Noncompeting Groups

• This reason emphasize difficulty in moving across occupations

• Labor markets are segmented into non-competing groups

• For some professions (e.g., doctors and economists), it is difficult and costly for a member of one profession to enter into the other

– The main reason of this market segmentation is that, for these professions, it takes a large investment of time and money to become proficient

– Once people specialize in a particular occupation, their earnings are subject to the supply and demand for skills in that occupation

➤ 员工激励问题

• 雇主雇佣员进行某种产品的生产

• 雇主和员工的目标与最优选择存在差异：

雇主希望员工努力工作以达到更高的劳动生产率，从而提高利润。

员工关心自己的福利。在赚取既定工资的前提下只想以最低的努力程度工作。

• 如果员工的努力程度无法观测，不能在合同上将劳动报酬与努力程度起来，与其结果是员工"偷懒"，劳动生产率低，利润水平低于雇主所希望的水平。

解决方法：

提高监管力度？

　　问题：增加成本；"偷懒"难以界定；不利于企业文化的发展。

引入激励机制

• 通过改变 偷懒/努力 的成本收益来达到减少偷懒，提高努力程度的目的。

• 策略 1 工资与产量目标（企业利润）挂钩，少罚多奖，或发放企业股份，使员工与企业的目标相同。

• 策略 2 引入竞争机制。

（竞争机制：假设一个经理雇佣了两个能力相似的员工。

　　　　经理让两个员工进行比赛，并对其中一个业绩最好的进行年终奖励 101 元。

　　　　由于两个员工能力相似，他们同时努力工作后每个员工胜出的概率均为 1/2。

　　　　假设努力工作的成本为 50 元。

　　　　员工的决策：

　　　　努力工作的预期收入=（-50）x 1/2 + (101-50) x 1/2 > 0

　　　　结果每个人都努力工作。而企业可能会从两人的共同努力中获得比 101 元更大的利润。）