

Week 1: Intro & Concepts (导论)

Health Econ (卫生经济学): Econ applied to health. Focus on allocation of scarce resources among competing ends. **Scarcity** (稀缺性): Resources (time, money, personnel) are limited vs. wants are unlimited. → Must choose. **Opportunity Cost** (机会成本): Value of *next best alternative* forgone.

Opp Cost = Value of Best Alternative Forgone

Example:

- **Avastin vs. Sovaldi**: Spending on cancer drug means less for Hep C drug.
 - **School**: Tuition + Books + **Forgone Earnings** (因上学损失的工资).
- Rationality** (理性): 1. Completeness, 2. Transitivity, 3. Maximize Utility. **Thinking on Margin** (边际思维): Decision based on *incremental* cost/benefit. "What does ONE more unit cost/benefit?" **Positive** (实证): "What is" (Fact, objective). **Normative** (规范): "What should be" (Value, subjective).
- Production Possibility Frontier** (PPF 生产可能性边界)
Max combo of 2 goods given resources/tech.
- **On curve**: Efficient (效率最高).
 - **Inside**: Inefficient (Resource wasted).
 - **Outside**: Impossible (Unless Tech shift).
 - **Slope**: Opportunity Cost (Give up Y to get X).
 - **Shift**: Tech ↑ or Resources ↑ → Shift Out.

Week 2: Demand for Health (健康需求)

Utility (U , 效用): Satisfaction. **Marginal Utility** (MU): $\Delta U/\Delta Q$. Diminishing MU (边际效用递减): First unit gives most joy. **Demand**: Willingness to Pay (WTP) = Marginal Benefit (MB).

$$MB = \frac{\Delta \text{Total Benefit}}{\Delta Q}$$

Consumer Choice (消费者选择)

Indifference Curve (IC, 无差异曲线): Bundles giving equal U .

- Downward slope, Convex to origin, Non-intersecting.
- Further from origin = Higher Utility.
- **Slope**: Marginal Rate of Substitution (MRS_{xy}).

Budget Constraint (BC, 预算约束): $I = P_x X + P_y Y$. Slope = $-P_x/P_y$. **Equilibrium** (均衡): Max U s.t. Budget. Tangency condition (切点):

$$MRS_{xy} = \frac{P_x}{P_y} \quad (\text{Marginal Benefit Ratio} = \text{Price Ratio})$$

Grossman Model (格罗斯曼模型)

Concept: Health is **Consumption** (feel good) & **Investment** (healthy time h_t for work/leisure). **Health Capital**: Stock H_t depreciates at rate δ . **Optimal Investment Condition**:

$$MEC = r + \delta$$

- MEC : Marginal Efficiency of Capital (Return on health inv).
- r : Interest rate (Opportunity cost of capital).
- δ : Depreciation rate (折旧率).
- **Aging**: As Age ↑ → δ ↑ → $(r + \delta)$ ↑ → Optimal Health Stock H^* ↓.

Demand Shifters (需求变动因素)

Movement: Only by Own Price Δ . **Shift**: 1. **Income**: Normal (Income ↑ D ↑) vs. Inferior (Income ↑ D ↓). 2. **Related Goods**: Substitutes (P_y ↑ D_x ↑), Complements (P_y ↑ D_x ↓). 3. **Tastes**: e.g., study says apples toxic → D ↓. 4. **Expectations**: Expect price rise → Buy now (D ↑). 5. **Population**: # Buyers ↑ → D ↑.

Elasticity (弹性)

1. **Own-Price Elasticity** (E_d): Sensitivity of Q_d to P .

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{\partial Q}{\partial P} \frac{P}{Q}$$

- $|E_d| > 1$ **Elastic**: (Luxury). P ↑ → TR ↓.
- $|E_d| < 1$ **Inelastic**: (Medical care). P ↑ → TR ↑.
- $|E_d| = 1$ **Unit**: Max Total Revenue.

2. **Cross-Price Elasticity** (E_{xy}):

$$E_{xy} = \frac{\% \Delta Q_x}{\% \Delta P_y}$$

- > 0 : **Substitutes** (替代品).
- < 0 : **Complements** (互补品).

3. **Income Elasticity** (E_I):

$$E_I = \frac{\% \Delta Q}{\% \Delta I}$$

- > 0 : **Normal** (Necessity $0 < E < 1$, Luxury $E > 1$).
- < 0 : **Inferior** (低档品).

Moral Hazard (道德风险)

Ex-ante (事前): Less prevention b/c insured (smoker). **Ex-post** (事后): More treatment b/c price lower (consume until $MB = \text{Copay}$). **RAND Exp**: Confirmed Demand slopes down ($E \approx -0.2$). Higher copay → lower use.

Week 3: Supply & Production (供给与生产)

Production Func: $Q = f(L, K)$. **Isoquant** (等产量线): Combos of L, K for same Q . Slope = MRTS. **Isocost** (等成本线): $TC = wL + rK$. Slope = $-w/r$. **Marginal Product** (MP , 边际产量): $\Delta Q/\Delta L$. *Law of Diminishing Returns*: As L ↑ (fixed K), MP_L ↓. Cobb-Douglas ($Q = AK^\alpha L^\beta$):

$$MP_L = \beta \frac{Q}{L}, \quad MP_K = \alpha \frac{Q}{K}$$

Costs (成本)

Short Run: K fixed ($TFC = rK$). **Long Run**: All inputs variable. **Formulas**:

- $TC = TFC + TVC$
- $ATC = TC/Q = AFC + AVC$
- $AVC = TVC/Q = wL/Q = w/AP_L$
- $MC = \Delta TC/\Delta Q = w/MP_L$

Relationships:

- MC cuts ATC and AVC at their **minimum points**.
- $MP \uparrow \implies MC \downarrow$. $MP \downarrow \implies MC \uparrow$.
- $MP > AP \implies AP \uparrow$.

Producer Optimization (生产者优化)

Minimize cost for given Q (Tangency of Isoquant and Isocost):

$$\frac{MP_L}{MP_K} = \frac{w}{r} \iff \frac{MP_L}{w} = \frac{MP_K}{r}$$

Meaning: Last dollar spent on Labor = Last dollar spent on Capital.

Profit Max (利润最大化)

Rule: Produce where $MR = MC$. Perf. Comp (P is fixed): $P = MC$. **Shutdown**: If $P < \min(AVC)$, shut down in short run.

Week 4: Market & Welfare (市场与福利)

Equilibrium: $Q_s = Q_d$. Market Clears. **Comparative Statics**:

- Demand ↑: P ↑, Q ↑.
- Supply ↑: P ↓, Q ↑.
- Demand ↑ + Supply ↓: P ↑, Q ambiguous.

Welfare Analysis (福利分析)

CS (消费者剩余): Area below Demand, above Price. Value of WTP - Price paid. **PS** (生产者剩余): Area below Price, above Supply. Price received - MC. **Total Surplus** (TS): $CS + PS$. Max at Equilibrium. **DWL** (无谓损失): Loss in TS due to distortion (Tax, Monopoly, Price Control).

Price Controls (价格管制)

1. **Price Ceiling** (上限): Max legal price.

- Effective if Set $< P^*$ (Below Eq).
- **Consequences**: Shortage ($Q_d > Q_s$), Black Market, Queues (Time cost), Quality deterioration.

2. **Price Floor** (下限): Min legal price (e.g., min wage).

- Effective if Set $> P^*$ (Above Eq).
- **Consequences**: Surplus ($Q_s > Q_d$, Unemployment).

Key Examples (核心例题详解)

Ex 1: Labor Demand (Blueberry Farm)

Given $P = 6, W = 100$. Find profit stats. **Rule**: Hire if $VMP_L \geq Wage$. ($VMP_L = P \times MP_L$).

L	Q	MP_L	VMP_L ($6 \times MP$)	Cost	Decision
0	0	-	-	-	-
1	70	70	420	100	Yes
2	130	60	360	100	Yes
3	180	50	300	100	Yes
4	220	40	240	100	Yes
5	250	30	180	100	Yes
6	260	10	60	100	No

Conclusion: Optimal $L^* = 5$. At $L = 6$, cost (100) > benefit (60).

Ex 2: Cobb-Douglas Optimization (生产要素优化)

Given: $Q = K^{0.4}L^{0.6}$, $w = 1, r = 1, Cost = 200$. Find K^*, L^* . **Step 1: Derivatives**

$$MP_L = 0.6 \frac{Q}{L}, \quad MP_K = 0.4 \frac{Q}{K}$$

Step 2: Optimization Condition ($MRTS = w/r$)

$$\frac{MP_L}{MP_K} = \frac{0.6Q/L}{0.4Q/K} = 1.5 \frac{K}{L} = \frac{1}{1} \implies L = 1.5K$$

Step 3: Budget Constraint

$$wL + rK = 200 \implies 1(1.5K) + 1(K) = 200$$

$$2.5K = 200 \implies K^* = 80$$

Step 4: Solve for L

$$L^* = 1.5(80) \implies L^* = 120$$

Ex 3: Doctor Productivity & Costs

Given: 10h shift, 20 pts. Wage \$100/h, MRI \$50k (Fixed). 1. **Average Product** (AP): $Q/L = 20/10 = 2$ pts/hr. 2. **TVC**: $w \cdot L = 100 \times 10 = \1000 . 3. **AVC**: $TVC/Q = 1000/20 = \$50$. 4. **ATC**: $(TFC + TVC)/Q = 51000/20 = \2550 . **Marginal Inference**: Since MP is diminishing ($MP < AP$), the last patient takes **longer** than average (> 30 min), so Marginal Cost is **higher** than average ($MC > \$50$).

Common Mistakes & Tips

- **Elasticity vs Slope**: They are related but NOT the same. Elasticity changes along a linear demand curve.
- **Sunk Cost**: Fixed costs (like MRI machine bought) are sunk in short run. Do not affect marginal decision (MC).
- **Income Effect**: For inferior goods, Income ↑ → Q ↓.
- **Shut down**: Compare Price to AVC , not ATC . Even if losing money, if $P > AVC$, keep running to cover some fixed costs.