Micro Note 1

2024年7月11日 10:50

Note 1

2021年12月3日 16:24

L1

1) Preferences

1. Completeness (分清哪个商品更喜欢, a > b)
2. Transitivity (逻辑上可对喜爱程度排序, a>b, b>c, 故a>C 此适a)
3. More is Better (多多益善)

2) Utility Function

relationship between utility measures and every possible bundle of goods.

(商品在消费组合下的效用)

L2

1) Budget Line

(给定收入下可实现的所有组合)

$Y = P_1 q_1 + P_2 q_2$

2) MRT : how the market allows consumers to trade one good for another. (等增加一单位a商品, b商品减少多少 (给定收入下))

$$MRT = \frac{dq_2}{dq_1} = \frac{P_1}{P_2}$$ (Budget Line 的斜率)

3) MRS : the maximum amount of one good that a consumer will sacrifice (trade) to obtain one more unit of another good while maintaining a certain level of utility.

(等增加一单位a商品, 到维持下的效用能变化多少)

$$MRS = \frac{dq_2}{dq_1} = -\frac{\frac{\partial U}{\partial q_1}}{\frac{\partial U}{\partial q_2}} = -\frac{U_1}{U_2}$$

4) Marginal Utility : the extra utility that a consumer gets from consuming the last unit of a good, holding the consumption of other goods constant.

(其它商品不变, 等增加一单位的商品所带来的效用的变化量)

$$MU = \frac{\partial U}{\partial q_1} = U_1$$

5) Constrained Optimum I

$MRS = MRT$

$-\frac{U_1}{U_2} = -\frac{P_1}{P_2}$

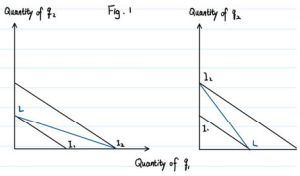
Perfect Complement (互补品) Perfect Substitution (替代品)

固有消费者每购买一件a就等一定量的b

因为a, b商品相同, 一但 MRS ≠ MRT, 消费者会全部买价格较低者

$U(A,V) = \min(iq_1, jq_2)$ $U(C,G) = iq_1 + jq_2$

Perfect substitutes	$iq_1 + jq_2$	$U_1 = i$	$U_2 = j$	$MRS = -\frac{i}{j}$
Perfect complements	$\min(iq_1, jq_2)$	$U_1 = 0$	$U_2 = 0$	$MRS = 0$
Cobb-Douglas	$q_1^a q_2^{1-a}$	$a\frac{U(q_1,q_2)}{q_1}$	$(1-a)\frac{U(q_1,q_2)}{q_2}$	$MRS = -\frac{a}{1-a}\frac{q_2}{q_1}$



L3

1) Constrained Optimisation II

已知: $\max_{q_1,q_2} U(q_1,q_2)$

s.t. $Y = P_1 q_1 + P_2 q_2$

Lagrangian Method:

$\max_{q_1,q_2,\lambda} \mathcal{L} = U(q_1,q_2) + \lambda(Y - P_1 q_1 - P_2 q_2)$

$Y - P_1 q_1 - P_2 q_2 = 0$

$\frac{\partial \mathcal{L}}{\partial q_1} = \frac{\partial U}{\partial q_1} - \lambda P_1 = U_1 - \lambda P_1 = 0$

$\frac{\partial \mathcal{L}}{\partial q_2} = U_2 - \lambda P_2 = 0$

$\frac{\partial \mathcal{L}}{\lambda} = Y - P_1 q_1 - P_2 q_2 = 0$

$\lambda = \frac{U_1}{P_1} = \frac{U_2}{P_2}$

Substitution Method:

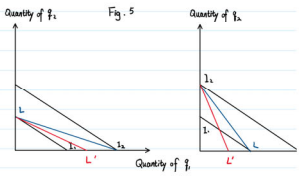
$MRS = \frac{dq_1}{dq_2} = -\frac{\frac{\partial U}{\partial q_2}}{\frac{\partial U}{\partial q_1}} = -\frac{U_2}{U_1} = MRT = \frac{dq_2}{dq_1} = -\frac{P_2}{P_1}$

$q_1 = \frac{(Y - P_2 q_2)}{P_1}$

$\max_{q_2} U\left(\frac{Y - P_2 q_2}{P_1}, q_2\right)$

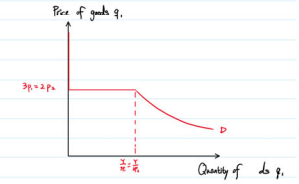
求导 $\max U$ 后得出 q_2

再带入原式得出 q_1

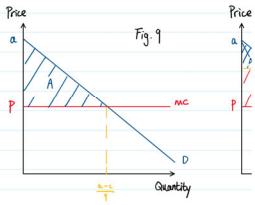


2) Demand Function

Perfect Substitutes				
$P_1 = P_2 = P$	$q_1 + q_2$	interior	$q_1 + q_2 = \frac{Y}{P}$	
$P_1 < P_2$	$q_1 + q_2$	corner	$\frac{Y}{P_1}$	0
$P_1 > P_2$	$q_1 + q_2$	corner	0	$\frac{Y}{P_2}$
Perfect Complements	$\min(q_1, q_2)$	interior	$\frac{Y}{P_1+P_2}$	$\frac{Y}{P_1+P_2}$
Cobb-Douglas	$q_1^a q_2^{1-a}$	interior	$a\frac{Y}{P_1}$	$(1-a)\frac{Y}{P_2}$



Perfect Substitution Demand Curve Cobb-Douglas



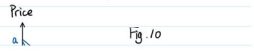


Fig. 2

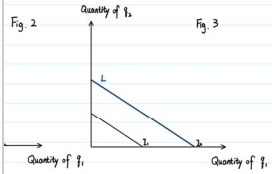


Fig. 3

Fig. 6

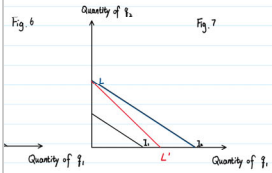
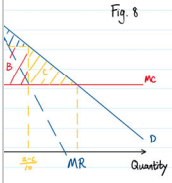
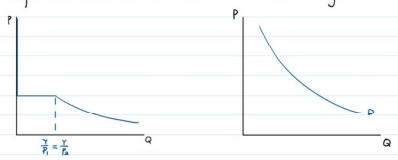


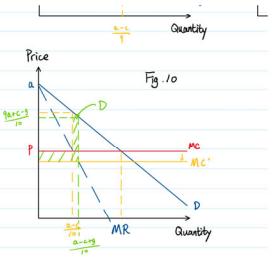
Fig. 7

Fig. 8



Perfect Substitution Demand Curve　　Cobb – Douglas





3) Effects of an increase in Income

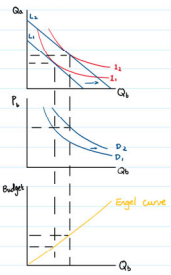
Change in an individual's income, holding tastes and prices constant, cause shift of the demand curve

(increase in normal good / decrease in inferior good)　(收入变化引D往移)

1. Income – consumption curve
(最大限用材商品的量)

2. Demand curve
(价格不是轴的商品)

3. Engel curve
(收入与商品)



4) Income Elasticities

$$\xi = \frac{\%\text{ change in quantity demand}}{\%\text{ change in income}} = \frac{\frac{\partial Q}{Q}}{\frac{\partial Y}{Y}} = \frac{\partial Q}{\partial Y}\frac{Y}{Q}$$

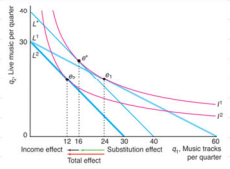
Normal Goods: positive ξ (收入越多买越多)
- Luxury Goods: $\xi > 1$
- Necessity Goods: $0 < \xi < 1$

Inferior Goods: negative ξ (收入越多买越少)

5) Effect of Price Increase

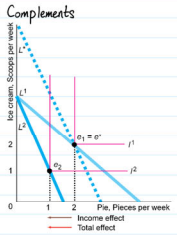
Substitution Effect: 相应价格变化所带来的 quantity D的变化
+　(总是负的)
Income Effect: 收入变化所带来的 quantity D 的变化
‖　(normal goods 时为负; inferior goods 时为正)
Total Effect

6) Normal Good



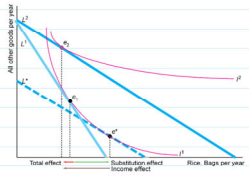
- Sub Effect: P 价格增加，选择替代品(取序 Indifference curve 下限制的 Budget Line 的斜率)
- Inc. Effect: P 价格增加，越原数购买相当于收入减少(收入到 Budget Line 下降的 Indifference curve)

7) Perfect Complements



- 没有 Sub. Effect:
(因为对消费者而言没有替代品，按新的 Budget Line 斜率所画的线仍是经原来的点 e,)
- Inc. Effect:
价格变化后相当于收入减少，购买更少

8) Inferior (and Giffen) Goods



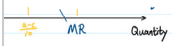
- Sub. Effect:
当价格降低，消费者购买更多
- Inc. Effect:
价格降低，收入直相增加，购买更少 ($\xi < 0$)

9) Compensated (Hicksian) Demand Curve

Expenditure function:
$E = E(p_1, p_2, \bar{U})$

求导:
$\frac{\partial E}{\partial p_1} = H(p_1, p_2, \bar{U}) = q_1$

(增加一个单位的商品所带来成本的变化量)


MR
Quantity

L_4

1) 公司种类

1. Private (for-profit)：私人或其它非政府的想获取利润的所有
2. Public：政府或政府或政府机构所有
3. Not-for-profit：非盈利组织所有

2) Profit

$$\pi = R - C$$

（π：利润；$R - C$：收入 - 成本）

$(R = p \times q)$

3) Production Function

$$q = f(L, K)$$

Cobb-Douglas function： $q(K, L) = AK^a L^b$

SR： $q = f(L, \bar{K})$

（q：产量；$f(L, \bar{K})$：函数关于（人工与资本（不变））

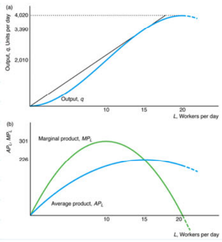
· Marginal Production of Labor (MPL)：现有生产要素不变下，每增加一单位的人工所能带来多少产出的增加

$$MP_L = \frac{\partial q}{\partial L} = \frac{\partial f(L,K)}{\partial L}$$ （产量的变化量比人工的变化量）

· Aver e Product of Labor (APL)：产出中占比多少是人工做的

$$AP_L = \frac{q}{L}$$ （总产量除以人工）

4) Diminishing Marginal Returns

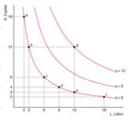


$$\frac{\partial MP_L}{\partial L} = \frac{\partial(\frac{\partial q}{\partial L})}{\partial L} = \frac{\partial^2 q}{\partial L^2} = \frac{\partial^2 f(L,K)}{\partial L^2} < 0$$

（每增加人工所额外带来的产出的变化量的变化量<0，也就是随着人工的增加，额外增加的产出逐渐减少）

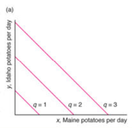
5) LR

Isoquant：summarizes the efficient combinations of inputs (L & K) that will produce a specific level of output.
（同一产量下所需的不同生产要素组合）



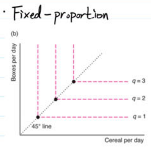
Properties
1. Do not cross
2. Slope down
3. Thin
4. Farther an isoquant is from the origin, greater level of output

· Perfect Substitutes



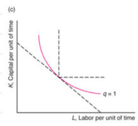
$$q = x + y$$

· Fixed-proportion



$$q = \min\{g, b\}$$

· Convex



$$q = L^{0.5} K^{0.5}$$

6) Marginal rate of technical subtitution (MRTS)

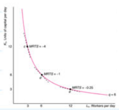
the slope of an isoquant at a single point. (Isoquant 上某一点的斜率)

$$MRTS = \frac{\Delta K}{\Delta L} = \frac{dK}{dL}$$

（当L变化多少时，K相应需变化多少以达到目标产量）
（公司可以用多少K去替代L）

$$\frac{dq}{dL} = 0 = \frac{\partial f}{\partial L} + \frac{\partial f}{\partial K}\frac{dK}{dL} = MP_L + MP_K \frac{dK}{dL}$$

$$MRTS = \frac{dK}{dL} = -\frac{MP_L}{MP_K}$$

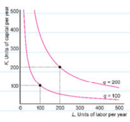


（K在y轴，L在x轴，故 |MRTS| 越大意味着当L变动1单位时，K的变化更多，所以越垂直）

7) Returns to Scale

· Constant RTS：产出随输入的生产要素同比例增加

$$f(2L, 2K) = 2f(L, K)$$



Production Function is homogenous of degree γ：

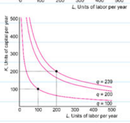
$$f(xL, xK) = x^{\gamma} f(L, K)$$ (x is a positive constant)

（$f(xL, xK)$：人工和生产设备各增 x 倍；$x^{\gamma} f(L,K)$：产出增加 x 的 γ 次方倍）

· Increasing RTS：产出增加比例大于输入的生产要素的比例

$$f(2L, 2K) > 2f(L, K)$$

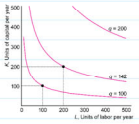
(Occurs with great specialization of L & K)



· Decreasing RTS：产出增加的比例小于输入的生产要素增加的比例

$$f(2L, 2K) < 2f(L, K)$$

(Occurs because of difficulty in organizing and coordinating activities as firm size increases)



8) Productivity

· Firms may not be equally productive

· Relative productivity: of a firm is the firm's output as a percentage of the output that the most productive firm in the industry could have produced with the same inputs.

(公司的相对生产力是公司与行业中生产力最高的公司使用相同投入可以产出的百分比)

影响相对生产力的

1. 管理方式
2. 科技创新
3. 工会对建筑的工做规定
4. 政府政策
5. 法律政策
6. 市场营销规模

L5

1) Efficiency

· Technologically efficient: Produce the desired level of output with the least inputs

(生产所需的产出要消耗的最少的输入生产要素的量)

· Economically efficient: Minimize the cost of producing a specified amount of output.

(生产特定产出所需的最小成本)

2) Cost

· Explicit costs: 关于生产要素的直接支出 (人工, 原材料, 生产工具...)

· Implicit costs: 所放弃的机会

· Opportunity costs: 该资源所能创造的被放弃的最高价值

· Sunk costs: 无法收回的与产量无关的产后费用

(不包括机会成本)

3) SR Cost (一段时间内一些生产要素可变)

(Labor is variable and capital is fixed)

· Total Cost (TC)

$C = VC + F$

总成本 = 可变成本 + 固定成本

· Marginal cost (MC)

$$MC = \frac{dC(q)}{dq}$$

(C 随 q 变化的量 / q 的变化)

(指生多生产一个单位产成本的变化)

· Average fixed cost (AFC)

$$AFC = \frac{F}{q}$$

(固定成本除产量)

· Average variable cost (AVC)

$$AVC = \frac{VC}{q}$$

(可变成本除以产量)

· Average cost (AC)

$$AC = \frac{C}{q} = \frac{VC}{q} + \frac{F}{q} = AVC + AFC$$

(总成本除以总产量)

4) Production Functions

SR: $q = f(L, \bar{K})$

(L 可变, K 固定, $\therefore q = g(L)$)

$\therefore$ 为了生产 q, $L = g^{-1}(q)$

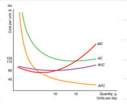
Wage = w , $VC = wL$

$V(q) = wL = w g^{-1}(q)$

(可变成本为工资乘以员工)

$TC: C(q) = V(q) + F = w g^{-1}(q) + F$

5) Graph



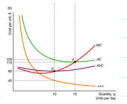
(可变成本仅为工资)

$$MC = \frac{dV(q)}{dq} = w \frac{dL}{dq}$$

(MP_L^{-1})

(MC 与 MP_L 方向相反)

$$MC = \frac{w}{MP_L} \quad (MP_L = \frac{\partial q}{\partial L})$$



$AC = AFC + AVC$

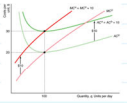
$AFC = \frac{F}{q}$

$AVC = \frac{w}{AP_L}$ (Diminishing marginal returns)

(AC 与 AP_L 方向相反)

$$AVC = \frac{VC}{q} = \frac{wL}{q} \quad (AP_L = \frac{q}{L})$$

6) Taxes on costs



AC & MC 都会影响

7) LR Cost (所有生产要素均可变)

(LR 中 F = 0)

Isocost line: 在固定成本下所有的生产要素的组合方式

$\bar{C} = wL + rK$

7) LR Cost (所有生产要素均变)

(LR中 F=0)

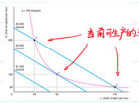
Isocost line: 在同等成本下所有的生产要素的组合方式

$\bar{C} = wL + rK$

(一条 isocost 中皆为同一成本)

$K = \frac{\bar{C}}{r} - \frac{w}{r}L$

(斜率 isocost 斜率相同, 且只有生产要素的相对价格有关)



当前可生产的点为 Isoquant 和 Isocost 交点.

8) Minimizing Cost

1. Tangency Rule

(成本最小的点是 isoquant 与 budget line (在此即 isocost) 的切线)

2. Last-dollar Rule

(在成本约束下, 在生产要素上花的最后一元钱都在其它生产要素下所带来的额外产出一样多)

$MRTS = -\frac{w}{r}$

isoquant 的斜率 ↖ ↗ isocost 的斜率

$MRTS = -\frac{MP_L}{MP_K} = -\frac{w}{r}$

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

Minimize Cost: (思路一: 生产所需成本最小)

$\min_{L,K} C = wL + rK$

$s.t.\ \bar{q} = f(L,K)$ (长期中 L 及 K 皆可变)

拉格朗日: $\max_{L,K,\lambda} \mathcal{L} = wL + rK + \lambda[\bar{q} - f(L,K)]$

first-order:

$\begin{cases} \frac{\partial \mathcal{L}}{\partial L} = w - \lambda \frac{\partial f}{\partial L} = 0 \\ \frac{\partial \mathcal{L}}{\partial K} = r - \lambda \frac{\partial f}{\partial K} = 0 \\ \frac{\partial \mathcal{L}}{\partial \lambda} = \bar{q} - f(L,K) = 0 \end{cases}$

last-dollar rule: $\frac{w}{r} = \frac{\frac{\partial f}{\partial L}}{\frac{\partial f}{\partial K}} = \frac{MP_L}{MP_K}$

Maximum Output: (思路二: 一定成本下产能最大)

$\max_{L,K} f(L,K)$

$s.t.\ \bar{C} = wL + rK$

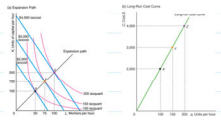
拉格朗日: $\max_{L,K,\lambda} \mathcal{L} = -f(L,K) + \lambda(\bar{C} - wL - rK)$

first-order:

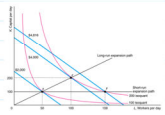
$\begin{cases} \frac{\partial \mathcal{L}}{\partial L} = \frac{\partial f}{\partial L} - \lambda w = 0 \\ \frac{\partial \mathcal{L}}{\partial K} = \frac{\partial f}{\partial K} - \lambda r = 0 \\ \frac{\partial \mathcal{L}}{\partial \lambda} = \bar{C} - wL - rK = 0 \end{cases}$

tangency rule: $\frac{w}{r} = \frac{\frac{\partial f}{\partial L}}{\frac{\partial f}{\partial K}} = \frac{MP_L}{MP_K}$

9) Expansion Path

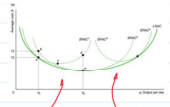


(描述让产量增加所带的最少成本的长期成本的增长路径)



(公司在 LR 上时更灵活, 故产量扩张在 LR 上比 SR 所带的成本更少)

10) Economies of Scale



: U形的 LRAC 与 AFC 的斜率或 Diminishing Marginal Returns 无关

E of S (当产出增加时, 生产的 AC 下降)

D of S (当产出增加时, 生产的 AC 增加)

11) Economies of Scope

(当公司用同一生产线生产多个产品时, 一个产品的成本会受另一个的产量影响)

E of S: 不同商品在一起生产的成本低于分别生产

$SC = \frac{C(q_1,0) + C(0,q_2) - C(q_1,q_2)}{C(q_1,q_2)}$

(单独生产 q_1 的成本) (单独生产 q_2 的成本) (结合 q_1,q_2 生产的成本)

(SC < 0 结合生产成本更低)

L4

1) Perfect Competition

(Buyers and Sellers are price takers)

Assumption

1. Large number of firms (无数家公司)
2. Identical (homogeneous) products (相同产品)

Assumption

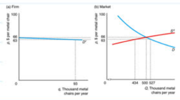
1. Large number of firms (无数家公司)
2. Identical (homogenous) products (相同产品)
3. Full information (完全信息)
4. Negligible transaction costs (瞬时交易)
5. Free entry and exit (进出无壁垒)

Demand

$D^r(p) = D(p) - S^o(p)$

residual demand (卖方不以任何给定价格都不满足的部分) ← $D^r(p)$; market demand ← $D(p)$; amount supplied by other firms ← $S^o(p)$

(哪怕不水平，D^r 也比市场需求平的多)



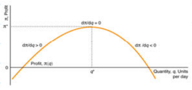
Profit Maximization (refers to economic profit)

$\pi = R - C$

1. Output decision：要多少 q^* 才能最大化
2. Shutdown decision：生产 q^* 是否也不生产有利可图

1、Output Rules

① 所设的产出是利润最大
② 所设的产出 MP (marginal profit) 为 0
③ 所设的产出下 MC = MR



2、Shutdown Rules

- 公司唯有在能减少损失的情况下会做
  - Shutdown 指停止一切生产活动且不支付其它可避免的成本 (avoidable cost)
  - Sunk cost 不可避免
  - 要 R 与 VC 相比之后决定
  - 可能是暂时的

(Shut down 是 SR 决定，长期所有成本可变)

2) SR Competition

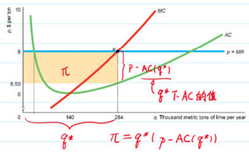
(水平的需求曲线意味着公司在市场卖任意数量商品)

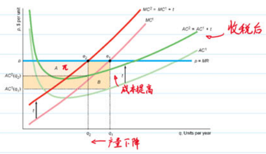
$R(q) = pq$

$$\frac{d\pi(q^*)}{dq} = \frac{dpq^*}{dq} - \frac{dC(q^*)}{dq} = p - MC(q^*) = 0$$

MP ↗ MR ↗ MC ↗

(MC = p(market price))
(MR = P ; MC = MR)



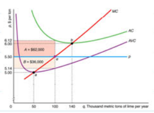


3) SR Shutdown Decision

$pq < VC(q)$

$$p < \frac{VC(q)}{q} = AVC$$

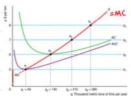
(当市场价格小于 SR 的最小 AVC 时)



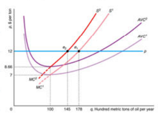
$AC(q^*) > p > AVC(q^*)$

4) SR Supply Curve

- 公司选择生产在最小 AVC 上的市场价最高点、(Supply 曲线起点)
- P 不断提高时，水平的 Demand 曲线与 MC 的交点也升高，导致更高的 Q



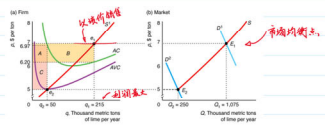
- 如果成本升高，S 向左移



- 市场 S 是各个公司 S 之和

5) SR Competitive Equilibrium

5) SR Competitive Equilibrium



征税后 $S_M \uparrow$；$S_I \uparrow$；AVCT；MCT.

6) LR

- Output Decision in LR 与SR一致，MC = MR
- Shutdown Decision，因为长期一切可变，因此 Shutdown 与继续生产相比一定 less.

1图上是自往于LRAC最低点。