

國立臺灣大學

開放式課程

《經濟學原理》

第三十一講

經濟成長模型 (Ch.25)

授課教師：國立臺灣大學經濟學系 林明仁教授

講義彙編：國立臺灣大學財務金融學系 吳郁婕



【本著作除另有註明外，採取創用 CC「姓名標示—非商業性—相同方式分享」臺灣 3.0 版授權釋出】

※本課程指定教材為 N. Gregory Mankiw: Principles of Economics (2012), 6th edition.

Model 1: Malthus 農業紀元中的人口與產出

(最古老的 growth theory)

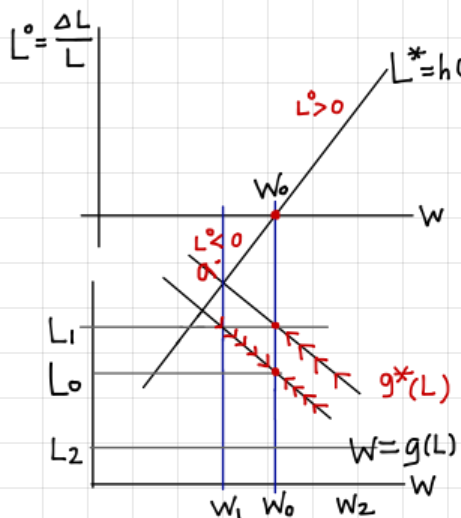
He assumed: (1) $W = P \times mpL = \frac{\Delta f}{\Delta L} = g(L, \bar{K}, \bar{A})$

(2) $\frac{\Delta L}{L} = L = h(w)$

Notice: 1. w 代替 income :: 農業社會 $I = w \times H$ (日出 → 日落)

2. (1) 中, w 和 L 成反比 ($mpL \downarrow$)

(2) 中, 人口成長率 和 w 成正比 ($w \uparrow$ = 生育率 ↑, 死亡率 ↓)



假設原來均衡 $w_0, L_0, L \cdot = 0$
 \Rightarrow 人口增加至 $L_1 \Rightarrow w_0 \downarrow$ 到 w
 \Rightarrow 黑點, $L \cdot$ 為負 (每人營養不足)
 人口減少, 回到 (L_0, w_0)
 (人口減少, 推論亦同)
 但若有新的外生事件, 如技術進步
 耕土地增加, 運河...
 $\Rightarrow g$ 會右移 $g^*(L_0, w^*) \rightarrow (w_0, L')$

Model 2: Solow Growth model

Key: show how growth of capital stock (K), labor force (L), and technology advance (A) interact in an economy as a whole, and how they offset a nation's total output.

Supply of the capital

$Y = AF(K, L)$ if F c.r.s
 規模報酬不變

$ZY = AF(zK, zL)$

Let $z = \frac{1}{L} \Rightarrow \frac{Y}{L} = AF\left(\frac{K}{L}, 1\right)$

$y = Af(k)$ output per worker depend on capital per worker
 $mpK = f(k+1) - f(k)$ notice it is still decreasing

Demand of capital

$y = c + i$

Solow assumes everyone saves s of their income

$C = (1-s)y$ so $c + i = y$ $i = sy = sAf(k)$



Add in another parameter: δ =depreciation rate 折舊率

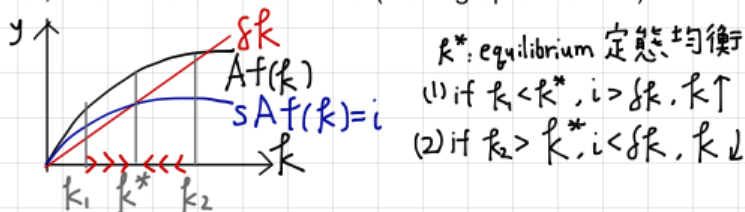
Capital just works out ($\delta=0.04$, on average)

=>change in capital: $\Delta k=i-\delta k$ (ex. $\Delta k=10-0.04*100=10-4=6$ 每人多了3台iPad)

=> $\Delta k=sAf(k)-\delta k$

When would a country's k stop changing?

i.e., when would we see $\Delta k=0$ (moving up or down?)

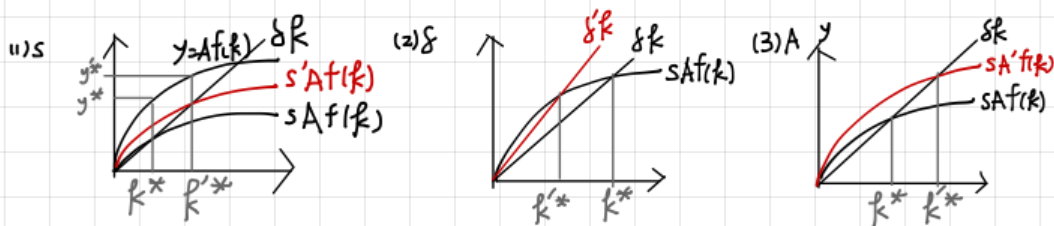


Solos model tell us:

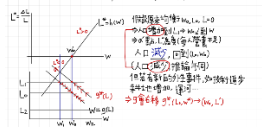

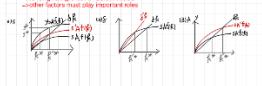

(1)no matter where it begins (i.e., k big or small)
 the economy eventually approaches to s.s. aka k
 why: $sf(k)$ is decreasing in k , but k fixed.

(2)one of the most important implication of s.s. result in there is

No long run growth in Solow model
 =>other factors must play important roles



版權聲明

頁數	作品	版權標示	作者/來源
2	<p>Model 1: Math+經濟學五種人口假設出 (最基礎的 growth theory)</p> <p>Headwind: (1) $w \leq r$; (2) $L \leq \bar{L}$; (3) $g \leq (1-R)w$</p> <p>Notice: 1. 經濟學假設: 簡單生產 $Y = wL + rK$ (其中 $w < r$) 2. 人口: w 和 r 的比較 (其中 $w < r$) 3. 人口: L 和 \bar{L} 的比較 (其中 $L < \bar{L}$) 4. 人口: g 和 $(1-R)w$ 的比較 (其中 $g < (1-R)w$)</p>  <p>Model 2: Solow Growth model Key: the rate of growth of capital stock, labor force, and technology determine the rate of economic growth, and from there the rate of population growth.</p> <p>Supply of capital: $Y = AF(K, L)$ (其中 F 是 concave) Demand of capital: δK</p> <p>Supply of labor: $L = L_0 e^{gt}$ (其中 L_0 是 initial labor force) Demand of labor: $L = L_0 e^{gt}$</p> <p>Key: $\dot{K} = Y - \delta K$ (其中 \dot{K} 是 capital accumulation) $\dot{L} = gL$ (其中 \dot{L} 是 labor force growth)</p>		製圖：國立臺灣大學經濟學系 林明仁教授、國立臺灣大學財務金融學系 吳郁婕
3	<p>Add to our list of assumptions: 1. Depreciation is not zero 2. Capital has a constant rate of return 3. The population is constant (or grows at a constant rate)</p> <p>Key: when $\dot{K} = 0$, we are at the steady state (or long-run equilibrium)</p> <p>Key: when $\dot{K} > 0$, we are above the steady state (or long-run equilibrium)</p> <p>Key: when $\dot{K} < 0$, we are below the steady state (or long-run equilibrium)</p> <p>Key: the steady state is stable (or convergent)</p> <p>Key: the steady state is unique (or there is only one steady state)</p> <p>Key: the steady state is efficient (or Pareto optimal)</p> <p>Key: the steady state is the only long-run equilibrium (or there are no other long-run equilibria)</p> 		製圖：國立臺灣大學經濟學系 林明仁教授、國立臺灣大學財務金融學系 吳郁婕