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)

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※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)

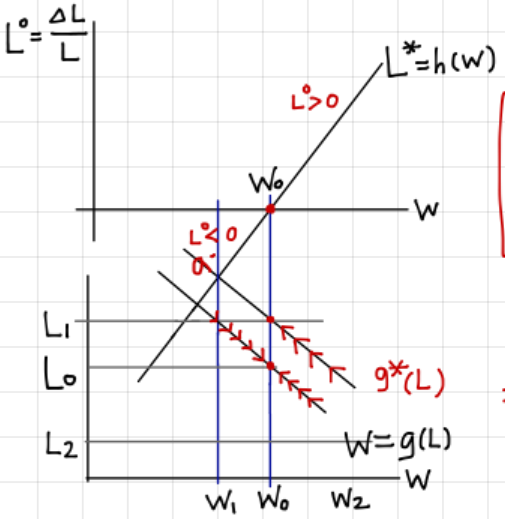
He assumed: (1) $W = P \times mpL = \frac{\Delta f}{\Delta L} = g(L, \bar{K}, \bar{A})$

(2) $\frac{\Delta L}{L} = L^{\circ} = h(W)$

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↑=生育率↑, 死亡率↓)



假設原來均衡 W_0, L_0, $L^{\circ} = 0$

⇒人口增加到 L_1 ⇒ W_0↓到 W

⇒α'點, L°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

耕地增加, 運河…

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

$y = Af(k)$ 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 $c + i = y$

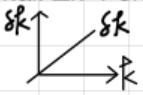
$i = S \cdot y$

$i = Sy = SAf(k)$

Add in another parameter: δ=depreciation rate折舊率

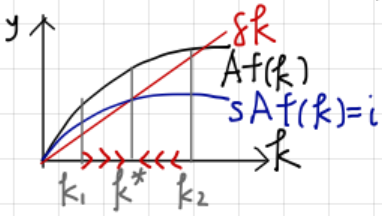
Capital just works out (δ=0.04, on average)

=>change in capital: Δk=i-δk (ex. Δk=10-0.04*100=10-4=6 每人多了3台iPad)

=>Δk=sAf(k)-δk 

When would a country's k stop changing?

i.e., when would we see Δk=0 (moving up or down ?)



k*: equilibrium 定態均衡

(1) if $k_1 < k^*$, $i > \delta k$, $k \uparrow$

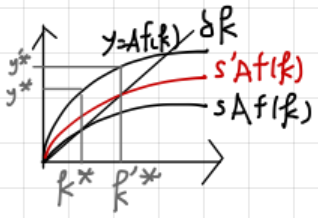
(2) if $k_2 > k^*$, $i < \delta k$, $k \downarrow$

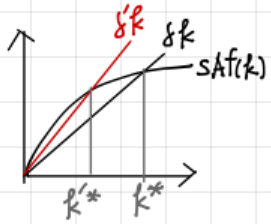
Solos model tell us:

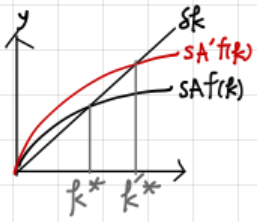
(1)no matter where it begins (i.e., k big or small)
the economy eventually approaches to s.s. aka k
why: sf(k) is decreasing in k, but k fixed.

(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

(1)s 

(2)δ 

(3)A 

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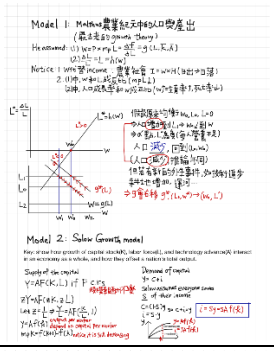
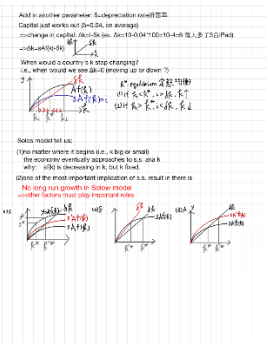
2			製圖：國立臺灣大學經濟學系 林明仁教授、國立臺灣大學財務金融學系 吳郁婕
3			製圖：國立臺灣大學經濟學系 林明仁教授、國立臺灣大學財務金融學系 吳郁婕