Economics 2: Growth
Setting up the Solow Model

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Lecture 2, Week 6

Government

- Assumption: Ignore the government

$$G = 0$$

$$T = 0$$

- *Government does not influence the long run of the economy growth*

Consumption Function

Short-run: $C = C_0 + (1-s)(Y-T)$

where s: marginal propensity to save

Long-run: $C = (1-s) \cdot Y$

Assume: $C_0 = 0$ (simplification)

$T = 0$ (ignoring the role of government)

$\Rightarrow$ *people consume a constant proportion of their income*

Saving Function

Short-run: $S = -S_0 + s(Y - T)$

Long-run: $S = s \cdot Y$

Assume: $C_0 = 0$ (simplification)

$T = 0$ (ignoring the role of government)

$\Rightarrow$ *people save a constant proportion of their income*

Investment Function

Short-run: $I = I_0 - b \cdot r$

I_0: exogenous "business expectations"

b: negative relation with interest rate

Long-run: Assume: $b = 0, \;\; I_0 = 0$

$\Rightarrow$ *all the saving in the economy gets invested*

Depreciation

- Depreciation: capital replaced due to wear and tear

  machinery needs to be serviced in order to be brought back to its original condition

- Capital depreciates at the rate of δ

- Capital Formation: *Any addition to capital stock first gets absorbed by depreciation and the residual gets added to capital stock.*

Two kinds of Investment

- Replacement Investment: compensates for depreciation

  Assumption: δK depreciates every period

- Net Investment: brand new capital stock

  new machinery for the economy

Capital Formation

- Today's investment is tomorrow's capital

$$\begin{aligned} I &= K_{t+1} - K_t + \delta K_t \\ &= \Delta K_t + \delta K_t \end{aligned}$$

Investment today $\rightarrow$

Compensation for Depreciation: δK_t

Addition to capital Stock: $\Delta K_t = K_{t+1} - K_t$

Worksheet 2, Figure 1

$$y = f(k)$$

- Show graphically that output per worker (y) increase concomitantly with capital stock per worker (k)
- Is there a clear relationship between growth of k and growth of y?
- Is there a limit to growth of k and y?

Goods Market Equilibrium

Short-run: $Y = C + I + G + NX$

Long-run: $Y = C + I$

Assumption: ignore G, T, NX

$$Y - C = I$$

$$S = I$$

Saving & Investment

$$S = I$$

$$sY = \Delta K_t + \delta K_t$$

divide both sides by L and rearrange

Fundamental equation: $\Delta k_t = sy - \delta k_t$

Worksheet 2, Figure 2

- Start from an arbitrary capital stock per worker k_0 and find the net increase in k per period
- Do you notice a pattern in the rate at which capital stock per worker (k) grows?
- Over time, what do you think would happen to rate at which output per worker (y) grows?

Reference

1. Factor Markets, Behaviourial Functions
   - Mankiw: Section 3-1 to 3-3
2. Solow Growth Model
   - Mankiw: Chapter 7, Section 8-1 to 8-3
   - Burda: Section 3.1 to 3.6
   - Jones: Chapter 2

Mankiw: *Macroeconomics* (Fifth Edition), N Gregory Mankiw

Burda: *Macroeconomics, A European Text* (Fourth Ediiton), Michael Burda and Charles Wyplosz

Jones: *Introduction to Economic Growth*, Charles Jones