ECON501 2018

lab06

DYNAMIC INEFFICIENCY IN DIAMOND MODEL

☐ Equilibrium in Ramsey model was Pareto efficient

☐ Diamond model admits the possibility of inefficiency o It is possible that k* is greater than Golden Rule k

o Why? Because survival in old age depends on saving lots of income regardless of rate of return.

o It is possible that the saving rate that is optimal for an individual might be higher than the saving rate that leads to Golden Rule level of k*

Ref: https://www.reed.edu/economics/parker/314/notes1.html

SUPPOSE THAT K* > KGR

- Suppose that there was another (than capital) way of transferring money from youth to old age (Social Security) so that saving could go down
- Young would be better off because they could consume more
- Future generations would be better off because k*↓ means higher steady-state c*
- Everyone is made better off and no one worse off, so original equilibrium must not have been Pareto optimal

HOW CAN MODEL BY INEFFICIENT? WHERE IS THE MARKET FAILURE?

- No externalities, but an absent market: no way for current generation to trade effectively with future generations
- Only way to provide for retirement is through saving, even if rate of return is zero or negative
- From social standpoint, it is desirable to avoid low- or negative-return investment, but for individual facing retirement this is only choice
- If benevolent government were to establish transfer scheme from young to old (like Social Security), then they would not need to accumulate useless capital in order to eat in retirement
- You will do a problem this week looking at the effect of alternative Social Security regimes in the Diamond model

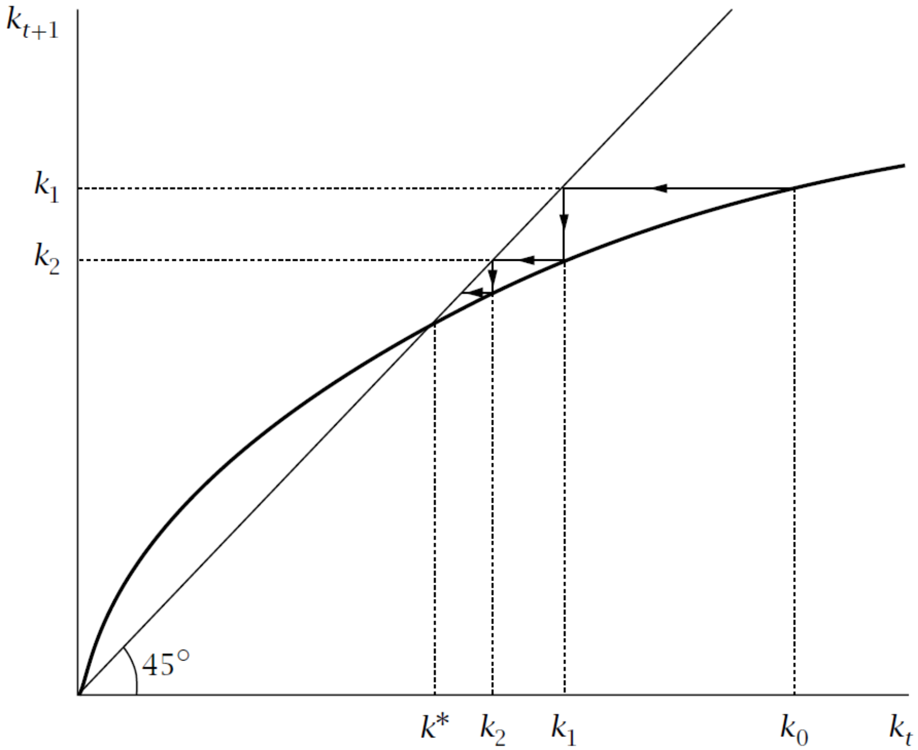

FIGURE 2.11 The dynamics of k

Logarithmic Utility and Cobb-Douglas Production

When θ is 1, the fraction of labor income saved is $1/(2+\rho)$ (see equation [2.55]). And when production is Cobb-Douglas, $f(k)$ is k^{α} and $f'(k)$ is $\alpha k^{\alpha-1}$. Equation (2.59) therefore becomes

$$k_{t+1} = \frac{1}{(1+n)(1+g)} \frac{1}{2+\rho}(1-\alpha)k_t^{\alpha}. \tag{2.60}$$

Figure 2.11 shows k_{t+1} as a function of k_t. A point where the k_{t+1} function intersects the 45-degree line is a point where k_{t+1} equals k_t. In the case we are considering, k_{t+1} equals k_t at $k_t = 0$; it rises above k_t when k_t is small; and it then crosses the 45-degree line and remains below. There is thus a unique balanced-growth-path level of k (aside from $k = 0$), which is denoted k^*.

2.17. Social security in the Diamond model. Consider a Diamond economy where g is zero, production is Cobb–Douglas, and utility is logarithmic.

(*a*) **Pay-as-you-go social security.** Suppose the government taxes each young individual an amount T and uses the proceeds to pay benefits to old individuals; thus each old person receives $(1 + n)T$.

(*i*) How, if at all, does this change affect equation (2.60) giving k_{t+1} as a function of k_t?

(*ii*) How, if at all, does this change affect the balanced-growth-path value of k?

(*iii*) If the economy is initially on a balanced growth path that is dynamically efficient, how does a marginal increase in T affect the welfare of current and future generations? What happens if the initial balanced growth path is dynamically inefficient?

(*b*) **Fully funded social security.** Suppose the government taxes each young person an amount T and uses the proceeds to purchase capital. Individuals born at t therefore receive $(1 + r_{t+1})T$ when they are old.

(*i*) How, if at all, does this change affect equation (2.60) giving k_{t+1} as a function of k_t?

(*ii*) How, if at all, does this change affect the balanced-growth-path value of k?

http://listinet.com/bibliografia-comuna/Cdu339-52C2.pdf

Page 60, Romer, 2.16. Social Security
Since the budget constraint changes, we have to solve the Diamond model again.