

Lecture Notes #4

- Romer, P "Endogenous Technological Change" Journal of Political Economy, October 1990, 98(5): S71-S102
- Shell, K. "Toward a Theory of Inventive Activity and Capital Accumulation" American Economic Review, May 1966, 56(1/2): 62-68
- Shell, K. "A Model of Inventive Activity and Capital Accumulation" in Essays on the Theory of Optimal Economic Growth (K. Shell, ed.), Cambridge, Massachusetts: MIT Press, 1967, Chapter IV, 67-85.
- Shell, K. "Inventive Activity, Industrial Organization and Economic Growth" in Models of Economic Growth (J.A. Mirrlees and N. Stern, eds.), London: Macmillan, and New York: Halsted (John Wiley & Sons), 1973, 77-100.
- Romer, P "Increasing Returns and Long-Run Growth," Journal of Political Economy, October 1986, 94(5): 1002-1037.

$$Y = Z + C + R = \Phi(A, K, L)$$

$$\lambda\Phi(A, K, L) = \Phi(A, \lambda K, \lambda L)$$

CRS in conventional factors, IRS in all factors

$$\dot{K} = Z - \mu K \qquad \dot{A} = R - \rho A$$

$$\dot{L} = nL, \text{ special case: } L = 1, \dot{L} = 0$$

Special Case #1: $Y = AF(K, L)$

homogeneous of degree 2 $y = Af(k)$

Close model:

R financed by tax on output at rate τ

$$C = (1 - s)(\textit{Disposable Income}) = (1 - s)(1 - \tau)Y$$

$$Z = s(1 - \tau)Y$$

$$R + C + Z = \tau Y + (1 - s)(1 - \tau)Y + s(1 - \tau)Y = Y$$

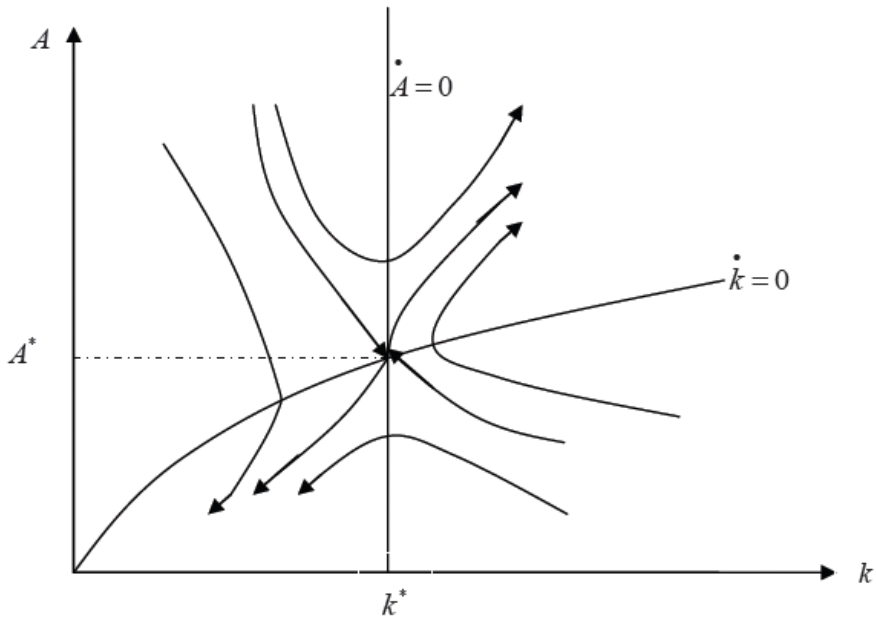
Dynamics:

$$\dot{A} = \tau Af(k) - \rho A \quad \dot{A} = 0 \Rightarrow f(k) = \rho/\tau$$

Define k^* by $f(k^*) = \rho/\tau$

$$\dot{k} = s(1 - \tau)Af(k) - \mu k \quad \dot{k} = 0 \Rightarrow A = \frac{\mu k}{s(1 - \tau)f(k)}$$

$\left(\frac{dA}{dk}\right)_{k=0} > 0$ since Average Production Capital $\frac{f(k)}{k}$ is decreasing in k



NOT planning problem

History matters!

Saddlepoint means:

(A^*, k^*) razor's edge

Poor countries tend to decay. Need big push.

Rich countries grow at increasing rate.

Extreme version of morphogenesis.