

Advanced Macroeconomics I

Lecture 7 (5) Endogenous Growth Models

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Romer's externality Model

- \bar{K} is the aggregate level of capital, K is the capital operated by the firm

$$F(K, L, \bar{K}) = AK^\alpha L^{1-\alpha} \bar{K}^\rho$$

- There are externalities to capital accumulation, so that individual savers do not realize the full return on their investment
- If $\rho = 1 - \alpha$, AK-Model
- If $\rho > 1 - \alpha$, then the balanced growth path would not be possible

Lucas' human capital accumulation model

- Plain labor is replaced by Human capital

$$F(K, H) = AK^\alpha H^{1-\alpha}$$

- There are two distinct capital accumulation equations:

$$K_{t+1} = (1 - \delta_K) K_t + I_t^K$$

$$H_{t+1} = (1 - \delta_H) H_t + I_t^H$$

- The resource constraint

$$c_t + I_t^K + I_t^H = AK_t^\alpha H_t^{1-\alpha}$$

Concluding Remarks

Exogenous Growth

$$AK^\alpha L^{1-\alpha}$$

AK Model

$$AK$$

Marginal productivity of K

$$\lim_{K \rightarrow \infty} A\alpha K^{\alpha-1} L^{1-\alpha} = 0 \quad A$$

Convergence

Divergence in relative income levels

- Introduce a "mystery capital", so that the production function looks like:

$$F(K, L, \bar{K}) = AK^\alpha L^{1-\alpha} \bar{K}^\rho$$

- Or, alternatively introduce "human capital" as the third production factor, besides physical capital and labor:

$$F(K, L, H) = AK^\alpha L^\beta H^{1-\alpha-\beta}$$