

6E:204 Macroeconomics
Assignment 6

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October 17, 2000

Due: October 24, 2000

Consider the following two-sector growth model. There is a representative household with preferences given by

$$\sum_{t=0}^{\infty} \beta^t N_t \frac{c_t^\gamma}{\gamma},$$

where $0 < \beta < 1$, N_t is population, c_t is per capita consumption, and $\gamma < 1$. The population evolves according to

$$N_t = (1 + n)^t N_0.$$

At the beginning of the period, the capital stock, K_t , and total labor supply N_t (each member of the household supplies one unit of labor inelastically) are allocated between production of consumption goods and production of investment goods. The aggregate quantity of consumption goods produced is given by

$$N_t c_t = (K_{1t})^{\alpha_1} (A_t N_{1t})^{1-\alpha_1},$$

where K_{1t} is the quantity of capital employed in the production of consumption goods, N_{1t} is employment in the consumption goods sector, $0 < \alpha_1 < 1$, and A_t evolves according to

$$A_t = (1 + a)^t A_0.$$

Further, given that capital depreciates by 100% each period, we have

$$K_{t+1} = (K_{2t})^{\alpha_2} (A_t N_{2t})^{1-\alpha_2},$$

where K_{2t} and N_{2t} are the quantities of capital and labor, respectively, allocated to the investment goods sector.

Determine the balanced growth path for this economy. What is the savings rate in this economy, and how does it depend on parameters? How will a change in any of the parameters determining the savings rate affect the level and rate of growth of income on the balanced growth path?