

ECON 405
ECONOMIC GROWTH AND DEVELOPMENT
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10 June 2013

Final
Ramsey Model

1. (50 Points) Suppose the economy is characterized by a production function in the form $Y_t = K_t^\alpha L_t^{1-\alpha}$, where $L_t = L_0 e^{nt}$, $L_0 = 1$, and $n > 0$ and an overall utility function $U(c) = \int_0^\infty u(c_t) e^{-(\rho-n)t} dt$, where the instantaneous utility function $u(\cdot)$ belongs to the constant elasticity of intertemporal substitution (CIES) class: $u(c_t) = \frac{c_t^{1-\theta} - 1}{1-\theta}$, $\theta > 0$.

- a. Solve the household's intertemporal utility maximization problem.
 - b. Solve the firm's profit maximization problem.
 - c. Solve the model at the steady state and find the equilibrium values of capital, output, and consumption.
 - d. Formulate the same problem by using the social planner's approach (Do not solve but only show first-order conditions).
 - e. Suppose now that you are given the following parameter values: $\alpha = 0.5$, $\theta = 2$, $\rho = 0.1$, $n = 0.02$, $L_0 = 1$, $\delta = 0.05$. Calculate the steady state values of capital, output, and consumption.
- 2. (50 Points)** Suppose the economy's production function is $Y = AK + K^\alpha$, where A is a productivity parameter. For simplicity, suppose that population is constant and normalized to one in the economy. By using the social planner's approach, solve the Ramsey problem and find the steady state values of capital, output, and consumption, if possible.