

Problem Set

MA17Q4-H

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[1] Capital accumulation equation

The capital accumulation equation for the Ramsey model is given by

$$\dot{\hat{k}} = f(\hat{k}) - \hat{c} - (\delta + g + n)\hat{k},$$

where \hat{k} is the capital stock per unit of effective labor, \hat{c} the consumption per unit of effective labor. Parameters δ , g , n are the depreciation rate, technical growth rate, population growth rate, respectively.

1. Suppose that the intensive-form production function is of Cobb–Douglas form, $f(\hat{k}) = \hat{k}^\alpha$. Draw a locus of (\hat{k}, \hat{c}) on which $\dot{\hat{k}} = 0$ is met.
2. Indicate the golden rule level of capital stock \hat{k}_G^* in the same graph.

[2] Utility

Consider the total utility function

$$\int_0^\infty e^{-\rho t} u(\hat{c}(t)) dt$$

1. Compute the total utility for a steady state level of consumption $\hat{c}(t) \equiv \bar{c}$; i.e. $\int_0^\infty e^{-\rho t} u(\bar{c}) dt$.
2. Compute the marginal rate of substitution between $\hat{c}(t)$ and $\hat{c}(s)$ for $t < s$.
3. Explain why you can interpret ρ as a measure of impatience. Use the above results.

