

Macroeconomics A

Problem set 5

This problem set will be collected at the beginning of the next class and marked. If you cannot make it to class you are advised to hand your solutions in before the deadline. No solution will be accepted after the deadline.

1. Show that the steady state equilibrium of the Ramsey-Cass-Koopmans models satisfies the solvency constraint (20) in the lecture notes. (Hint: in steady state $R_t = r_t t$ as r_t is constant. Use the steady state equilibrium values of r_t and b_t .)
2. Consider the Ramsey-Cass-Koopmans model with Cobb-Douglas production function $Y = K^\alpha(AL)^{1-\alpha}$, with $0 < \alpha < 1$. The economy is initially in steady state equilibrium. Suppose there is a permanent increase in the rate of growth of technological progress g .
 - (a) Write down the consumer optimization problem and derive the Euler equation.
 - (b) Impose factor markets equilibrium and derive the capital accumulation equation and the equation describing the evolution of c in equilibrium.
 - (c) Derive the effect of the shock, if any, on the $\dot{k} = 0$ curve.
 - (d) Derive the effect of the shock, if any, on the $\dot{c} = 0$ curve.
 - (e) Derive the new equilibrium time paths of k and c .
 - (f) Use the Euler equation and the dynamic constraint evaluated at the steady state equilibrium to derive the steady state saving rate $s^* = 1 - c^*/f(k^*)$ as a function of the parameters of the model. Derive restrictions on parameters that ensure that the steady state saving rate increases with an increase in g .