

Problem Set 8
Spring 2005, Econ 702

Problem 1 Consider the AK model we covered in class. Derive the necessary condition for the balanced growth path in this economy.

Problem 2 (Transitional dynamics) Consider the transformed hat NGM with labor augmenting technological change. Write down the Euler equation and show that there is a unique K_t/A_t ratio that would generate a BGP instantaneously (i.e. if economy starts with any other ratio it would have a transition path towards BGP in which variable growth rates are observed). Analyze AK model same way and show that it does not have any transitional dynamics. What would this imply for cross-country convergence? Is it in accord with observed facts?

Problem 3 Show that CRRA utility function is compatible with BGP. (Note that it is the only one that is consistent with a BGP yet proving implication both ways requires solving partial differential equations and not necessary for our purposes)

Problem 4 Consider the Lucas Human Capital model in which human capital accumulation occurs through investment of physical resources. Derive the FOC and show that constant growth rate for consumption is possible only if both capital and human capital grows at the same rate as consumption. Also show that the growth rate of investment in both types of capital is also constant on a BGP.

Problem 5 Consider the Human Capital model in which accumulation of human capital requires allocating time for it. Compute the BGP of this economy (derive the necessary conditions for the model, assume constant growth rate for variables and derive the relationship that has to hold between these growth rates).

Problem 6 Consider the externality model of Romer. We do know the equilibrium allocation in this model generates lower growth than optimal. Define a policy that would imply the optimal growth rate, i.e. find a tax and/or subsidy rate on a factor of production and/or consumption such that, facing this policy agents actions result in optimal growth rate, that is the growth rate from the solution to the SPP.