

Dynamic Programming and Business Cycles  
IDEA Program  
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Problem Set #2  
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Due date: Jan. 28th

**Problem 1.** Consider a two class society, similar to the one we've seen in class: a fraction  $\lambda$  of the population is more "patient" than the other ( $1 - \lambda$ ) fraction. Agents never change their type (i.e., they don't become more patient or less patient). Besides different levels of patience, agents are identical in any other respect.

1. Write the problem for this economy in recursive form and define a recursive competitive equilibrium, when there is leisure/labor choice.
2. Imagine now that there is a constant probability  $\mu \in (0, 1)$  of changing types and that this probability is independent of which type the agent is in the current period. Write the problem of the individuals, being very careful with the state variables and continuation values. Define a recursive competitive equilibrium.

**Problem 2.** Assume that production of capital is a two stage/period process. That means that any single household has a portfolio  $\{a_0, a_1\}$ , where  $a_0$  are resources that have been just invested (are not valued by the firm, since they are in incubation process), while  $a_1$  are resources that can be rented to the firm at rate  $R$ . Agents in this economy only value consumption. Define the problem of the agents in this economy and define a recursive competitive equilibrium. Derive the euler equation for this economy.

**Problem 3.** Consider the job search problem we saw in class:

1. How does the reservation wage ( $R$ ) change when there is a change in unemployment benefits ( $b$ )? What if the probability of finding a job decreases?
2. Setup a variant of the simple job search problem: now there is a constant probability  $\xi$  of being fired from a job and there is also a probability  $p_j$  to receive a job offer while working (with related job offer function  $P_j(\omega)$ ). Write the problem of the agent. Is there a reservation wage-type of solution for this extended model?