

## Problem set 6

Due Wednesday June 3 in class

### 1 Bank Runs

Consider an economy with three periods  $t = 0, 1, 2$ . Individuals are endowed with one unit of the consumption good at  $t = 0$ . There is a technology that gives a return of  $1 + r > 1$  in  $t = 2$  if investment was done in  $t = 0$ . If the investment is interrupted in period  $t = 1$  the return is 1 (i.e. you get the same one unit that was invested). In addition, goods can be stored from period 1 to 2.

There are two types of agents. With probability  $\theta$  the agent will be "impatient" (of type 1) who cares only about consumption at  $t = 1$ . With probability  $1 - \theta$ , the agent will be "patient" (of type 2) and care only about consumption at  $t = 2$ . Agents realize their types after investment is done. Preferences can be described by the expected utility

$$U(c_1, c_2) = \theta\left(-\frac{1}{c_1}\right) + (1 - \theta)\left(-\frac{1}{c_2}\right).$$

In the aggregate, the probabilities also represent fractions of each type of consumers.

1. Write down the consumers' problem in case of no banking, i.e. without any possibility of insurance. Compute the optimal consumption for patient and impatient agents, and their expected utility  $EU^{nb}$ . Also compute the per capita output of the economy  $Y^{nb}$  (aggregate over agents and periods 1 and 2).
2. Suppose banks accept deposits at time 0 and pay  $d_1$  if you withdraw your deposits at  $t = 1$ , and  $d_2$  if you withdraw your deposits at  $t = 2$ . Solve for the optimal consumption of both types of consumers. How does it compare to consumption from part (a)?
3. Compute the expected utility  $EU^b$  and aggregate output  $Y^b$ . Do they differ from the case of autarchy? How?
4. What happens if all agents want to withdraw their deposits at  $t = 1$ ?