Seminar Problem in ECON 4335 Economics of Banking, Fall 2016

Problem set 1 (September 9 and 16, 2016)

Consider the one-good, two-types, three-dates economy of Diamond and Dybvig. There are infinitely many, *ex ante* identical, individuals, each endowed with one unit of the good at $t = 0$. Consumption takes place either at $t = 1$ or $t = 2$. With probability λ a consumer needs to consume at $t = 1$, and with probability $1 - \lambda$ at $t = 2$. There is an independent draw for each agent. Ex post the consumers can be divided into group 1, impatient consumers, and in group 2, those who will wait until $t = 2$ (patient consumers). An individual's type is private information. The utility function of a consumer is $u(c) = \frac{c^{1-s}}{1-s}$ where c refers to the level of consumption in the period in which the consumer needs to consume, with $s > 1$. There is no discounting.

The economy has two ways of transferring resources between periods: storage (called a short-term project) with gross return equal to 1, and a long-term investment project, with gross return at $t = 2$, equal to $R > 1$, per unit invested at $t = 0$. If necessary, the long-term project can be liquidated or stopped prematurely at $t = 1$, with a return $L \in (0, 1)$.

(1) Derive the allocation that maximizes social welfare, as given by expected utility. How is initial wealth allocated between the two investment opportunities? Will there be any liquidation?

(2) Let optimal consumption be C_1^* for a type 1-individual, and C_2^* for a type 2-individual. Who will have the higher consumption? Explain why an uneven distribution can be optimal. How is the optimal consumption profile affected by s?

(3) Assume that in the economy there is a competitive banking sector, where individuals can deposit their unit wealth at $t = 0$. The banks have the same investment opportunities as above. Suppose the banks offer the depositors the opportunity to withdraw at $t = 1$ or at $t = 2$. Explain why and under what circumstances the optimal allocation can be realized as an equilibrium.

(4) When banks offer the deposit contract $\{C_1^*, C_2^*\}$, explain why there are two (Nash) equilibria that are consistent with rational behavior for all individuals; one where only the early consumers withdraw at $t = 1$, and another one where everyone withdraws at $t = 1$. What will the individual consumption level be in the latter equilibrium if you assume $L = 1$?

(5) Suppose the banking sector offers the contract $\{C_1^*, C_2^*\}$ to depositors at $t = 0$. Imagine that a financial (or a bond) market is opened at $t = 1$. A bond is here a promise to have one unit consumption at $t = 2$. Late consumers are offered to buy bonds at a price $p = \frac{1}{R}$. Will $\{C_1^*, C_2^*\}$ still be a Nash equilibrium? Explain!

(6) Consider a different setting. Suppose the draw that determines whether a consumer is an early or a late one is perfectly correlated among the individuals: with probability λ all consumers are impatient, while with probability $1 - \lambda$ all consumers are patient. Do banks improve over autarky in this setting?