Problem set 4 (September 24, 2015)

Problem 1

Consider the market for liquidity described in Diamond and Rajan (2011). In particular, let's assume that P_1 is exogenous, and a fraction β of each bank's assets is composed of financial securities that can be sold in period 0 or in period 1. The rest of the assets are loans that can be recalled at date 1. Both the security and the loans have face value Z in period 2. The liquidation value of the loans, denoted l, is distributed uniformly between 0 and Z. The value of deposits is D, a shock hits in period 1 with probability q, and in case of shock depositors withdraw an amount fD of deposits in period 1. Assume that P_1 is sufficiently large that the bank expects to be solvent in period 1 even if it does not sell any security in period 0.

1) What condition should P_0 and P_1 satisfy to ensure that buyers are indifferent to buy securities in either period 0 or period 1?

2) Let's say that the bank plans to sell a fraction η_1 of its security at date 1 (if the shock hits), and not sell any security in period 0. What fraction of the loans will be liquidated in case of shock? What is the average l of the liquidated loans? Can you find an expression for η_1?

3) Let's say that the bank plans to sell a fraction η_0 of its security at date 0 AND NOT SELL ANY SECURITY IN PERIOD 1. Moreover, assume that P_0 and P_1 are such that the bank is indifferent to sell its security in period 0 and in period 1. What fraction of the loans will be liquidated in case of shock? What is the average l of the liquidated loans? Can you find an expression for η_0?

4) Is is true that for P_1 and P_0 that satisfy the condition you found in question (1) the bank is indifferent between selling assets in period 0 and period 1?

Problem 2

Consider a market in which there are N banks and N buyers of securities. Each banks owns a security that ensures a return R in the next period. Half of the securities ensure a return $R = 1$, and half ensure a return $R = 0$. If a bank does not sell the security, the security is worth $\frac{1}{2}R$ to the bank in the next period, while buyers get a utility from a security equal to its return. The time discount factor is normalized to 1. Banks know the return of their own security, while buyers only know the distribution of returns.

1) Is there a price for which all securities are sold?

2) Is there a price for which securities are sold only if $R = 0$?

3) Assume now that the security is worth $k \in (0, 1)$ to the bank. For which values of k there exists a price for which all securities are sold?