ECON 4335 Economics of Banking, Fall 2017
Problem Set 3

September 15, 2017

1. Illiquid banks

Consider the market 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 $t = 0$ at P_0 or in $t = 1$ at P_1. The rest of the assets can be liquidated. Each asset has liquidation value denoted l, distributed uniformly between 0 and Z. Both the securities and the other assets have face value Z in period 2. 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 $t = 1$ even if it does not sell any security in period $t = 0$.

1. What condition should P_0 and P_1 satisfy to ensure that investors are indifferent to buy securities in either $t = 0$ or $t = 1$?

2. Let's say that the bank plans to sell a fraction η_1 of its securities at $t = 1$ (if the shock hits), and not sell any security in $t = 0$. What fraction of the assets will be liquidated in case of shock? What is the average l of the liquidated assets? 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 $t = 1$*. Moreover, assume that P_0 and P_1 are such that the bank is indifferent to sell its securities in $t = 0$ or in $t = 1$. What fraction of the assets will be liquidated in case of shock? What is the average l of the liquidated assets? Can you find an expression for η_0?

4. Is it true that for P_1 and P_0 that satisfy the condition you found in question 1 the bank is indifferent between selling securities in $t = 0$ or in $t = 1$?

☞ Diamond, D. W. and Rajan, R. G. (2011), Fear of fire sales, illiquidity seeking, and credit freezes, *Quarterly Journal of Economics* 126, 557-591.

2. Asymmetric information, price discovery, and market freeze

Consider a market in which there are N banks and N buyers of securities. Each bank 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 $\underline{R} = \frac{1}{2}R$ 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. Will the result in question 1 change if $\underline{R} = R$ instead?