Econ 105, Spring 2008
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Problem set 3: Answers

1. Using the idea of adverse selection, explain why rationing might exist in credit markets (be sure to explain what you mean by rationing). *A lender may not raise the interest rate even in the face of excess demand for loans if he/she thinks the potential pool of borrowers will be adversely affected by a higher interest rates on loans. For example, at higher interest rates, we show that it may be those with riskier projects that still wish to borrow. Thus, adverse selection (the impact of the interest rate on the pool of borrowers) may lead the lender to decide not to raise the interest rate. Thus, excess demand may exist in which at the equilibrium interest rates, some borrowers are turned away (rationed) even though these borrowers look identical (ex ante) to borrowers who do receive loans.*

2. Consider the example of bank runs used in class: notation and assumptions follow the class presentation. Each investor's expected utility is

$$\frac{1}{4}\left[1-\left(\frac{1}{r_1^d}\right)\right]+\frac{3}{4}\left[1-\left(\frac{1}{r_2^d}\right)\right]. \tag{1}$$

If investors put \$100 into the bank, which the bank invests in the illiquid asset ($r_1 = 1$, $r_2 = 2$), the bank will need to sell $25r_1^d$ at $T = 1$ to meet withdrawal demand by the type 1 investors. It will have $(100 - 25r_1^d)$ left in its portfolio. This pays off $2(100 - 25r_1^d)$ and this is available to payout to the type 2 investors at $T = 2$. So

$$r_2^d = \frac{2(100-25r_1^d)}{75}. \tag{2}$$

(a) Using (2) and (1), find expected utility as a function only of r_1^d. *Substitute (2) into (1) to yield*

$$\frac{1}{4}\left[1-\left(\frac{1}{r_1^d}\right)\right]+\frac{3}{4}\left[1-\left(\frac{75}{200-50r_1^d}\right)\right]=1-\frac{1}{4}\left(\frac{1}{r_1^d}\right)-\frac{3}{4}\left(\frac{1.5}{4-r_1^d}\right)$$

(b) What value of r_2^d maximizes the expected utility of investors? The first order condition is

$$\frac{1}{4}\left(\frac{1}{r_1^d}\right)^2-\frac{3}{4}(1.5)\left[\frac{1}{\left(4-r_1^d\right)^2}\right]=0$$

$$\left(\frac{1}{r_1^d}\right)^2=\left[\frac{4.5}{\left(4-r_1^d\right)^2}\right]$$

$$16 - 8r_1^d + \left(r_1^d\right)^2 = 4.5\left(r_1^d\right)^2$$

$$3.5\left(r_1^d\right)^2 + 8r_1^d - 16 = 0$$

The roots to this quadratic are -3.5672 *and* 1.2815*. Since* r_1^d *must be positive, the relevant solution is* 1.2815*. Using this result in (2),*

$$r_2^d = \frac{2(100 - 25r_1^d)}{75} = \frac{2(100 - 25 * 1.2815)}{75} = 1.812.$$

3. Explain why a bank run can occur in the Diamond-Dybvig model. *If Type 2 depositors (investors) expect too many others to withdraw funds at time* $T = 1$*, they will expect the payout at time* $T = 2$ *to be lower than what they could get by withdrawing at time* $T = 1$*. At that point, all depositors find it optimal to withdraw funds at* $T = 1$*.*

4. Briefly explain what is meant by the financial accelerator? *The basic idea is that borrowing costs and the efficiency of the financial sector can depend on the value of collateral borrowers have. If asset prices fall, this reduces the value of collateral, making it harder for borrowers to get financing for investment prijects. This causes a further decline in economic activity and asset prices, accelerating the collapse. If borrowers need to liquidate assets to repay debt, asset prices fall further, lowering the value of collateral even more.*