

Problem Set 10.1

ECON 30020: Intermediate Macroeconomics

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Instructions: This problem set covers material related to banking and bank runs. It is only for practice in preparation for the final exam. You do not need to turn anything in. Solutions will be posted by the last day of class.

1. **Adverse Selection:** Suppose that there is a household with \$1 to lend. The household will be willing to lend provided it gets at least \$1 back in expectation. There are two entrepreneurs who need funding for a project – Zach and Dominic. If Dominic gets \$1 of funding, his project will earn \$1.15 with certainty and he pays back $1 + r$ to the lender. If Zach gets funding, with probability $\frac{1}{2}$ the project will succeed and he earns \$1.8 and he pays back $1 + r$ to the lender; if the project fails it earns nothing and the lender loses the \$1 of funding. Zach and Dominic will take a loan if the r is such that their expected profit is non-negative.
 - (a) Suppose that the household/lender can tell Zach and Dominic apart. Which of them will be able to secure funding, and at what range of interest rate?
 - (b) Now suppose that the household cannot tell Zach and Dominic apart. The household just knows that there is a probability p it is dealing with Dominic, and a probability $1 - p$ it is dealing with Zach. Solve for a value of p at which neither Zach nor Dominic will be able to get funding.
2. **Liquidity Management and Bank Runs:** Suppose that you have a bank which begins with the following balance sheet.

Assets	Liabilities plus Equity
Loans: \$100	Deposits: \$100
Cash Reserves: \$20	Equity: \$20

Suppose that deposits cost the bank $r = 0.05$ in interest each period, and loans (if they are held on the balance sheet) earn $r^I = 0.10$. Cash reserves earn nothing. The bank is not required to hold any cash but may choose to do so to meet withdrawal demands. If the bank is forced to sell loans, it must do so at a 50 percent discount (i.e. raising \$1 in cash requires selling \$2 of loans).

- (a) Calculate the equity multiplier, the leverage ratio, and the liquidity ratio.

- (b) Assume that a period goes by and there are no unexpected deposits or withdrawals and the bank makes no additional loans. Calculate the return on assets and the return on equity. Verify that the return on equity equals one plus the leverage ratio times the return on assets.
- (c) Assuming that the bank cannot borrow funds from a central bank (or another bank), what is the maximum withdrawal of deposits the bank can handle before it becomes insolvent?
- (d) Suppose instead that the bank starts with a balance sheet of:

Assets	Liabilities plus Equity
Loans: \$80	Deposits: \$100
Cash Reserves: \$40	Equity: \$20

Re-do parts (a)-(c). Is the bank's return on equity larger or smaller with this balance sheet compared to the original one? Is the bank more or less likely to be unable to handle a large withdrawal shock with this balance sheet or the original one?