

## Midterm Exam 2

You have 65 minutes to complete this 60 minute exam. Be sure to “box in” your answers. Show your work (so that partial credit can be granted if the final answer is incorrect).

### 1. [20 minutes] Monetary policy.

1.1 (3 minutes) Draw a graph of the reserves market, where the demand curve takes the conventional shape, and the central bank lends freely at 5%, but does not pay interest on excess reserves. Assume the equilibrium interest rate is above zero but below 5% in your graph.

1.2 (3 minutes) Show what happens if the central bank increases above and beyond the point where the policy rate stops changing. Indicate the amount of quantitative easing.

1.3 (4 minutes) Show what happens to the equilibrium rate if the central bank pays interest of excess reserves, in excess of 0 (1%).

1.4 (5 minutes) Suppose the central bank purchases long term government bonds using the reserves injected in part 1.2. What happens to the interest rate on long term bonds relative to short term bonds if they are perfect substitutes? (Recall the two are linked by the model of the term structure laid out in the handout.)

1.5 (5 minutes) Consider the central bank is trying to lower the 2 year interest rate on government bonds, and the pure expectations hypothesis of the term structure holds. If the 1 year interest rate on year in the future is 2%, and the central bank issues forward guidance such that it convinces the public that the future 1 year interest rate will be 1%. What is the immediate impact on the 2 year interest rate? Show your work.

### 2. [20 minutes] Leverage, liquidity, and bank balance sheets. If you cannot reduce to actual numbers, **be sure to show your algebraic work!**

2.1 (5 minutes) Consider two banks, H (high bank capital) and L (low bank capital).

High Bank Capital		Low Bank Capital	
Assets	Liabilities	Assets	Liabilities
Reserves \$9M	Deposits \$90M	Reserves \$10M	Deposits \$96M
Loans \$71M	Bank Capital \$10M	Loans \$70M	Bank Capital \$4M
ABS \$20M		ABS \$20M	

Bank capital is the equity of the owners (shareholders) of the bank. ABS stands for asset backed securities.

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 2%.

2.2 (5 minutes) Show what happens to each of the bank balance sheets when the asset backed securities lose 25% of their value.

2.3 (5 minutes) Now consider two banks, one which borrows less short term, and one that borrows a lot on short term money markets.

Bank Deposit Based		Money Market Based	
Assets	Liabilities	Assets	Liabilities
Reserves \$6M	Deposits \$60M	Reserves \$3M	Deposits \$30M
Loans \$74M	Short term \$30M	Loans \$77M borrowing	Short term \$60M borrowing
ABS \$20M	Bank Capital \$10M	ABS \$20M	Bank Capital \$10M

Calculate the return on equity (ROE) for each bank, if the rate of return on loans is 5%, and 10% on ABS, and the interest rate on deposits is 2%, and the interest rate on short term borrowing is 1%.

2.4 (5 minutes) In a world without deposit insurance, which bank is more vulnerable to a “run”? Explain your answer.

3. [20 minutes] Consider a Taylor rule of the following form:

$$i_t^{FedFunds} = \pi_t + 0.5(\pi_t - \pi_t^*) + r_t^* \quad (1)$$

3.1 (5 minutes) Suppose the output gap is -3.0%, and the inflation rate is 2.0%. Calculate the central bank’s implied policy rate, assuming the equilibrium real rate of interest is 2%, and target inflation rate is 2%. Show your work.

3.2 (5 minutes) Suppose the equilibrium real rate of interest drops to -1%, but all else remains the same. How much should the central bank drop the policy rate.

3.3 (10 minutes) Suppose the government increases spending so that the equilibrium real rate of interest rises back to 2%. What should the central bank do, and what short term impact will this have on the economy? Be specific, and use an **IS-LM diagram** to explain.