Final Exam

July 25, 2009

PART 1

1. What are the three major functions of money?   [3]

   - The functions are medium of exchange, unit of account, store of value.

   - 1 point is given for each function.

2. Does M2 now include the deposits at Japan Post Bank?   [3]

   - No.   M2 does not survey Japan Post Bank, while M3 does.

3. Suppose that a country's GDP grows at an annual rate of 10%.   How long does it take to be doubled?   [3]

   - About 7 years.   I emphasized it when we discussed the effect of compounding interests.

   - "About 8 years" is also given three points.

4. Which asset usually accounts for the largest part of M1?   [3]

   - DEPOSIT MONEY accounts for about 85% of M1, as of April 2009.

   - "Demand deposits" is also fully graded.

   - "Cash currency" is apparently a mistake.

5. Which is a more liquid asset, one-year bond or ten-year bond?   [3]

   - One-year bond.   Everyone gave me the correct answer.

PART 2: Answer in four to six lines for each question

1. Explain the TERM STRUCTURE OF INTEREST RATES and the empirical facts about the patterns of yield curves.   [10]

   Essential factors:

   A) TERM STRUCTURE OF INTEREST RATES is a relationship between bonds' maturities and their interest rates.

   B) The term structure can be visualized by yield curves, which are plots of bonds' terms to maturity and their interest rates.

   C) Fact1: yield curves often shift, which means that the interest rates for different maturities tend to move together.

   D) Fact2: Yield curves slope upward when the short-term rates are relatively low, while they slope downward when the short-term rates are relatively high.

   E) Fact3: Yield curves almost always slope upward.

   Grading Criteria:

   - 5 points to A).

   - If any one of C), D), and E) is mentioned, you get 3 points.   If all of the facts are mentioned, you get 5 points.

2. Explain RISK-NEUTRALITY with an example.   [10]

Essential factors:

A) An example: one investment plan which certainly gives us ¥5,000, and the other one which gives us nothing with the probability of 50%, and ¥10,000 with 50%.

Both give us the same expected return of ¥5,000.

B) A risk neutral investor equally evaluates both of the two plans, though the latter includes risk or uncertainty, while the former does not.

Grading Criteria:

- 5 points are given for each of A) and B).

3. Explain REQUIRED RESERVE RATIO.   [10]

- Commercial banks are legally required to have a particular fraction of deposits as reserve in their central bank.   This fraction is required reserve ratio.

PART 3:

1. Answer the following questions based on the expectations theory of the term structure.

   (1) (Simple calculation) Calculate the interest rates for maturities of one to five years, and plot the resulting yield curves for the following series of one-year interest rates over the next five years:

   a. 3%, 5%, 7%, 5%, 5%   [5]

$$\text{2-year rate } = \frac{3+5}{2} = 4\% \quad \text{3-year rate } = \frac{3+5+7}{3} = 5\%$$
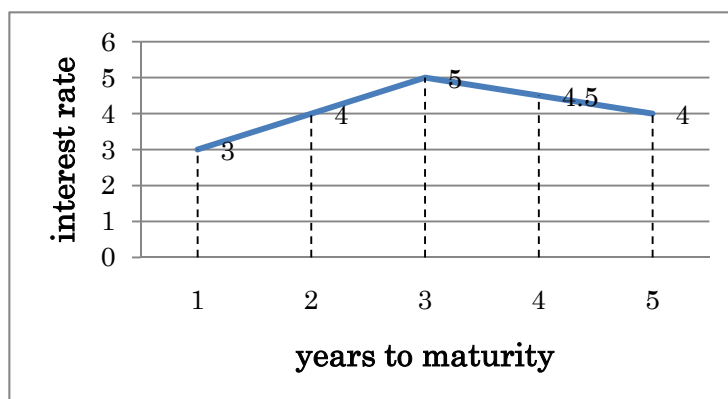
$$\text{4-year rate } = \frac{3+5+7+5}{4} = 5\% \quad \text{5-year rate } = \frac{3+5+7+5+5}{4} = 5\%$$
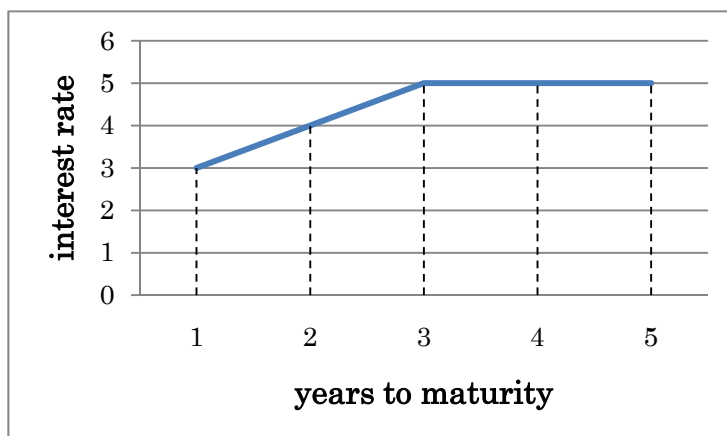
   b. 3%, 5%, 7%, 3%, 2% [5]

$$\text{2-year rate} = \frac{3+5}{2} = 4\% \quad \text{3-year rate} = \frac{3+5+7}{3} = 5\%$$

$$\text{4-year rate} = \frac{3+5+7+3}{4} = 4.5\% \quad \text{5-year rate} = \frac{3+5+7+3+2}{4} = 4\%$$

Grading criteria:

- 5 points to each graph.
- You need not show algebraic work to get full points, as long as the calculated interest rates are clearly recognized from your graphs.

(2) If a yield curve looks like the one shown below, what is the market's prediction about the movement of future short-term interest rates? [10]

Essential factors:

A) The expectations theory predicts the n-year interest rate is equal to the average of n one-year rates that we expect today.

B) Until the third year ahead, people expect 1-year rates to fall.

C) After the fourth year, 1-year rates are expected to rise "sharply". Please note that in order for the 4-year rate to be higher than the 3-year rate, the 1-year rate in the fourth year must be higher than the "average" of the 1-year rates from the first to the third year. Therefore, the 1-year rate in the fourth year needs to rise sharply.

- 2 points to A).
- 4 points to B) and C), respectively.
- Some students explain "why" people have such expectations that make the yield curve look like this, rather than "what" people expect the future 1-year rates to be when the yield curve looks like this, though I asked you the latter question.

2. Suppose that the Bank of Japan buys ¥10 billion of government bonds from MG Bank, a commercial bank.

   (1) Draw the T-accounts for the BOJ and MG Bank.   Be careful that the BOJ pays for the bonds through the MG Bank's reserve.   [5]

BOJ		MG Bank	
Bonds +100	Reserves +100	Bonds -100	
		Reserves -100	

   - 5 points for the both T-accounts.
   - 3 points for only one of them.

   (2) Does this operation increase or decrease MG Bank's reserve?   [5]
   - This operation increases MG Bank's reserve.

   (3) What does MG Bank do next?   [5]
   - There is no increase in deposits, while an increase in MG Bank's reserve and therefore no required increase in reserve.   Because reserve earns no interest, MG Bank will try to lend this excess reserve and earn income.

   (4) Finally, how does this operation by the BOJ affect the amount of deposits at commercial banks in Japan, and thereby the supply of money?   [5]
   - Through the multiplying effect, deposits are newly created one after another by commercial banks, the sum of which exceeds the increase in reserves.
   - Since the deposit money is the component of money stock, the BOJ's purchase of government bonds increases the supply of money.

   (5) How does this operation affect the interest rate based on our model of interest rate determination?   Explain the process in detail where the market reaches a new equilibrium.   Be careful about the relationship between the price of a bond and its interest rate.   You can draw a graph, if it helps.   [15]
   Essential factors:
   A) Money supply increases.
   B) At the initial equilibrium interest rate, the amount of money people hold exceeds the amount they want to hold, therefore they begin to replace their money with bonds.
   C) The demand for bonds increases, causing the price of bonds to rise, and the interest

rate to fall.

D) As the interest rate falls, the demand for bonds is discouraged, and the demand for money is stimulated.

E) Finally, when the price of bonds are high enough (i.e., the interest rate is low enough), people are willing to hold the money newly supplied.

F) We have a new equilibrium where the interest rate is lower than before.

Grading criteria:

- Graphs are not necessary.
- All of these steps should be included for full points.
- If some steps are missed, your answer is partially graded as 5, 10, and 13 depending on the importance of what you have missed.