

Econ 353 Money, Banking, and Financial Institutions
Spring 2006

Midterm Exam 1

Name _____

- The duration of the exam is 1 hour 20 minutes.
- The exam consists of 11 problems and it is worth 100 points.
- Please write in the space provided. If necessary, write on the back of the page.
- Please ask me if you have any questions.
- To receive full credit you have to carefully explain all your answers and show all your work.

General advice: *If you get stuck in the early parts of a problem, do not stop there. You can receive substantial partial credit by explaining how you would solve the rest of the problem if you had the necessary answers from its previous parts.*

1. (20 points) Determine whether each of the statements below is True or False:

Money is defined as anything that is generally accepted in payment for goods and services or in the repayment of debt.

True.

U.S. Treasury is responsible for the conduct of monetary policy in the United States.

False. Federal Reserve conducts monetary policy in US.

The monetary aggregate M3 includes fewer types of assets than the monetary aggregate M1.

False. The opposite is true.

Of money's three functions, the one that distinguishes money from other assets is its function as a store of value.

False. There are many other assets that store value.

The conversion of a barter economy to one that uses money increases efficiency by reducing the cost of exchange.

True.

People find money a convenient store of value because its value remains fixed to the price level; that is, if prices double so does the value of money.

False. If prices double, the value of money is halved.

Currency is a part of M1, but not M2 and M3.
False. M1 itself is part of both M2 and M3.

According to the liquidity premium theory, if the upward sloping yield curve signals that the interest rates are expected to rise.

False. The upward sloping yield curve can happen even if interest rates do not move. The reason is that bonds with longer maturities include liquidity (risk) premium.

2. (5 points) The Chicago Tribune ran a story on February 9, 2006 saying that the Chicago Mercantile Exchange will introduce financial instruments based on the amount of snow that falls in New York's Central Park and Boston's Logan International Airport. Although the details have yet to be released, it is possible that one of the contracts will specify that "the seller of the contract agrees to pay the buyer of the contract \$100 for every inch of snowfall above the first 3 inches in a month of January". Who could benefit from buying and selling such a contract?

A company that directly benefits from large amounts of snow in and around New York City may want to sell such a contract – for example, a company selling snowmobiles, or a company producing salt that is used to treat snowy roads. A company that directly suffers from large amounts of snow in and around New York City may want to buy such a contract – for example, a company dealing with clearing roads of snow, or an insurance company (because the number of claims resulting from car accidents goes up in bad weather).

3. (10 points) You purchase a consol with annual coupon payments of \$50, the interest rate is 6%. One year later the interest rate has changed to 5% and you decide to sell the consol. What is your one-year holding period return?

The holding period return is equal to

Return=Coupon payment/Price Paid + Change in Price/Price Paid.

We have to determine the price of the bond at the time of purchase. The price has to be equal to the present value of all future payments. Since the coupon payments are going to be paid infinitely, the present value is equal to $PV=Coupon/i=\$50/0.06=\833.33 . The price in one year is going to be $PV=Coupon/i=\$100/0.05=\1000 (The payments are still going to continue infinitely in the future)

So the change in price is equal to $\$1000-\$833.33=\$166.67$ (capital gain). There will be one coupon payment of \$50 in one year.

The holding period return is therefore:

Return= $\$50/\$833.33 + \$166.67/\$833.33 = 0.26$ (26%).

4. (5 points) What are the three main risks associated with holding bonds? Which of them affect bond ratings?

Default Risk.

Inflation Risk.

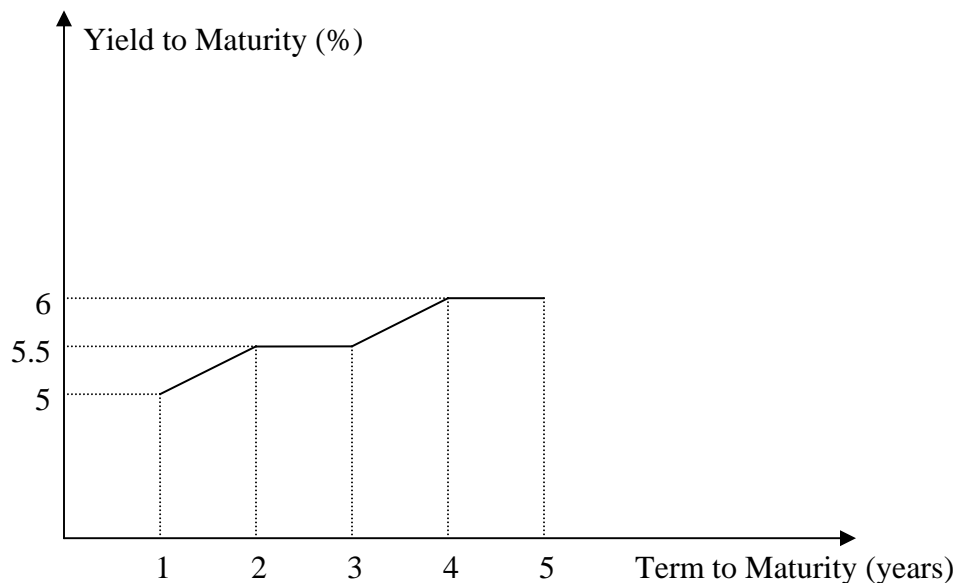
Interest Rate Risk.

The first type of risk is an idiosyncratic risk – it affects each specific bond individually. In other words, the fact that default risk on bond A goes up doesn't imply that the default risk on bond B will go up too.

Inflation and interest rate risks are systemic risks – they affect the whole economy. If inflation risk goes up – it affects all bonds.

We would probably expect the default risk to play the largest role in the determination of ratings of different bonds. Systemic risks affect all bonds and will not allow to distinguish among them.

5. (20 points) Suppose that the following yield curve is observed today:



- a. Name at least two regularities observed in the data on term structure of interest rates.

There are three main regularities:

Yields on bonds with different maturities tend to move together over time.

Short-term yields are more volatile.

Long-term yields tend to be higher than the short-term yields (yield curve is typically upward sloping).

- b. Assuming that the expectations hypothesis is true, determine the current yield on 1-year bonds, 2-year bonds, 3-year bonds, and 4-year bonds?

There are no calculations involved. These rates are obtained directly from the graph:

**1-year bonds – 5%,
2-year bonds – 5.5%,
3-year bonds – 5.5%,
4-year bonds – 6%.**

- c. Assuming that the expectations hypothesis is true, determine the yield on 1-year bonds one year from today, two years from today, and three years from today? Would you be able answer this question without assuming that the expectations hypothesis is true?

Expectations hypothesis says that the (yearly) interest rate on a two-year bond is the average of this year's interest rate on a one-year bond and the next year's interest rate on a one-year bond (the first part of the subscripts denotes the maturity of the instrument (1-year, 2-year, and 3-year, and so on), the second part in parentheses denotes the time period (t-today, t+1 – a year from today, t+2 – two years from today, and so on)):

Yield on a two-year bond today: $i_{2(t)} = (i_{1(t)} + i_{1(t+1)})/2 = (5 + i_{1(t+1)})/2 = 5.5\%$; where $i_{1(t+1)}$ is the unknown yield on 1-year bond one year from now. Solving for it we get $i_{1(t+1)} = 6\%$.

Similarly, the (yearly) yield on a three-year bond is the average of the yields on one-year bonds today, a year from today, and two years from today:

Yield on a three-year bond today: $i_{3(t)} = (i_{1(t)} + i_{1(t+1)} + i_{1(t+2)})/3 = (5 + 6 + i_{1(t+2)})/3 = 5.5\%$; where $i_{1(t+2)}$ is the unknown yield on a 1-year bond two years from now. Solving for it we get $i_{1(t+2)} = 5.5\%$.

Yield on a four-year bond today: $i_{4(t)} = (i_{1(t)} + i_{1(t+1)} + i_{1(t+2)} + i_{1(t+3)})/4 = (5 + 6 + 5.5 + i_{1(t+3)})/4 = 6\%$; where $i_{1(t+3)}$ is the unknown yield on a 1-year bond three years from now. Solving for it we get $i_{1(t+3)} = 7.5\%$.

It is not possible to solve this part without assuming that expectations hypothesis is true.

- d. What is the main drawback of the expectations hypothesis? Which theory addresses this drawback? Briefly outline the main idea of this theory?

The main drawback of the expectations hypothesis is that it doesn't explain why yield curve is upward sloping most of the time (interest rates do not rise most of the time). The liquidity premium theory builds on the expectations hypothesis and

incorporates the risk premium. Risk premium allows us to explain why long-term yields tend to be higher than short-term yields.

6. (5 points) If \$1102.50 is the amount payable in two years for a \$1000 simple loan made today, what is the internal rate of return of this loan?

The internal rate of return (i) solves the following equation:

$PV = \$1000 = \$1102.5 / (1+i)^2$, this equation means that the present discounted value of the future payment of \$1102.5 should be equal to the amount given today. The rate that solves this equation is $i = 0.05$ (5%).

7. (5 points) Suppose you are holding a 5 percent coupon bond maturing in one year with a yield to maturity of 15 percent. If the interest rate on one-year bonds rises from 15 percent to 20 percent over the course of the year, what is the one-year holding period return on this bond?

The key here is to realize that one year holding period return on a one-year bond is equal to the yield-to-maturity (simply because you'll be holding the bond until its maturity). So the one year holding period return is equal to 15%.

8. (5 points) Name at least two reasons why bonds with the same maturity would have different returns?

There are three main reasons for this:

Differential tax treatment (municipal bonds).

Different risks.

Different liquidity.

9. (10 points) Explain the difference between direct and indirect finance. What role do financial intermediaries and financial markets play in this process? Explain whether direct or indirect finance is a more important source of funds and why this is the case.

Direct finance involves transfer of funds directly from borrowers to lenders, while for indirect finance, funds are channeled from borrowers to lenders through intermediaries.

Direct finance occurs in financial markets, while indirect finance involves financial intermediaries. Indirect finance is arguably more important, because transactions costs and asymmetric information (moral hazard and adverse selection) make direct finance costly in many cases. Financial intermediaries (e.g., banks) evolved to deal with asymmetric information and transaction costs.

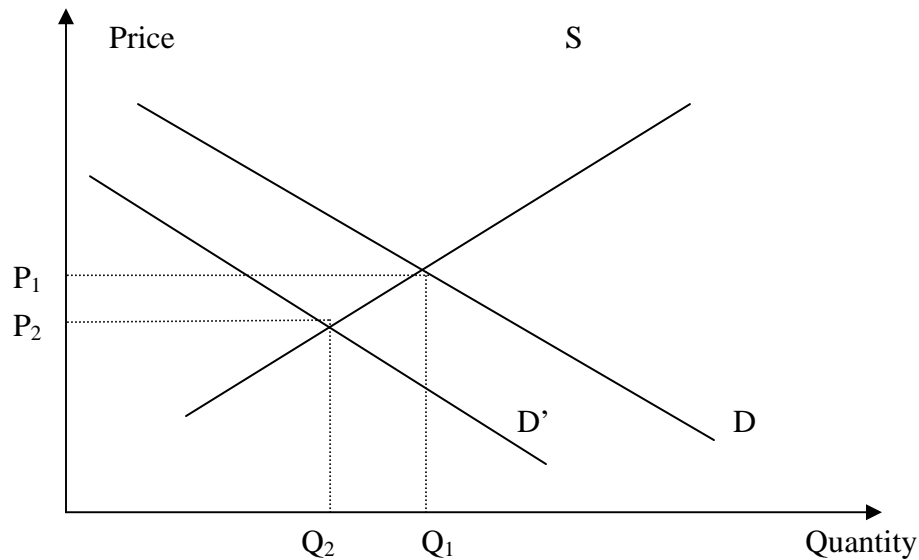
10. (5 points) Which of the following 1-year, \$1,000 face-value securities has highest yield to maturity?

- i. A 5 percent coupon bond selling for \$1,000
- ii. A 10 percent coupon bond selling for \$1,000
- iii. A 12 percent coupon bond selling for \$1,000
- iv. A 12 percent coupon bond selling for \$1,100

Clearly, iii offers higher yield to maturity than both i and ii because the price is the same, but coupon rate is higher in iii. At the same time, despite offering the same coupon rate, iii offers higher yield than iv because you can buy it cheaper than iv (you'll have higher capital gain). So, iii offers highest yield to maturity.

11. (10 points) Using the supply-demand graph explain what will happen to the long-term bond prices and interest rates if interest rates are expected to rise in the future.

If interest rates are expected to rise in the future, bonds become less attractive today (higher interest rates in the future mean lower bond prices in the future, which in turn mean capital losses to bond holders). So the demand for bonds will decrease (shift to the left):



The bond prices will fall and the interest rates will rise.

The formulas you may or may not need:

$$PV = [C/i] * [1 - 1/(1+i)^n],$$

$$PV = FV/(1+i)^n,$$

$$\text{Expected value} = \text{value} * \text{prob}(\text{value}) + \text{value} * \text{prob}(\text{value}) + \dots$$

$$\text{Variance} = (\text{value} - \text{expected value})^2 * \text{prob}(\text{value}) + (\text{value} - \text{expected value})^2 * \text{prob}(\text{value}) + \dots$$

$$i_{n(t)} = (i_{1(t)} + i_{1(t+1)} + i_{1(t+2)} + \dots + i_{1(t+n-1)})/n.$$