Sample Answers on Midterm Exam
June 16, 2009

·   Please be kind to write your answers in so clear letters and graphs to recognize. Remember that you must be easily understood to be correctly evaluated.

·   Make your explanations be consistent; proceed step by step, without any discontinuous jump, until you reach your conclusion.

PART 1:

1. When and how does finance help us to be better off?   Give me at least one example and explain it.   [5]

2. Explain what the "REAL INTEREST RATE" is, in comparison with the "NOMINAL INTEREST RATE".   [5]

      Real interest rates are the interest rates <u>adjusted for inflation and deflation</u>, and it tells us the rate of return <u>measured in terms of goods and services</u> or how the purchasing power increases over time.   On the other hand, nominal interest rates are the interest rates <u>measured in terms of money</u>, not adjusted for inflation or deflation.

3. What is the relationship among the three definitions of money stock by the Bank of Japan, M1, M2, and M3?   [5]

      M1 is the strictest definition of money and includes <u>cash currency in circulation and deposit money</u>.   M2 is a broader definition and on the top of the M1 components, includes <u>quasi-money</u>, such as time deposits.   M3 covers the same range of financial products as M2, but it surveys <u>a wider range of financial institutions</u>, including Japan Post Bank.

4. Explain the "PRICE" and "FACE VALUE" of a bond.   [5]

      The price of a bond is <u>the price at which the buyer pays to the issuer </u>to hold the bond. The face value of a bond is <u>the amount of money which, at the maturity date, the issuer pays to the holder</u> to repurchase the bond.

5. Explain "LIQUIDITY".   [5]

      Liquidity is <u>the ease and speed with which a particular asset can be converted into a medium of exchange</u>.   Cash currency has the highest level of liquidity of all the assets because it is itself a medium of exchange and thus requires no conversion. On the other

hand, bonds, for example, only have low level of liquidity because it takes time and money to convert them into a medium of exchange.

PART 2: Detailed explanation with examples, equations, or graphs

1. Explain the "FUNCTIONS OF MONEY" and how money improves the efficiency of our economy.   [20]

   - Medium of exchange: without money as a medium of exchange, we would be in a barter economy where trade occurs only with the double coincidence of wants.   We would have to spend more effort and more time searching for a person who has what we want and also wants what we have.   Money as a medium of exchange enables us to spend more effort and time producing goods and services, thus promoting economic efficiency.
   - Unit of account: every good and service can be priced in terms of money and be compared with each other.   Without money, every good and service must be priced against every other good and service, and more time and effort is spent accounting those relative prices.   For example, in a world with 10 varieties of goods, we need to calculate 10(10-1)/2=45 relative prices.   Money as a unit of account saves us time and effort, thus promoting economic efficiency.
   - Store of value: the value of goods and services we produce can be easily transferred to the future by changing them into money.   Money as a way to store value helps us to smooth out consumption over time, instead of spending instantly after our income is earned.   It surely promotes efficiency of spending.

2. Explain how the "YIELD TO MATURITY" is calculated and what it tells us, and derive the relationship between a bond price and its interest rate (yield to maturity).   (If you have difficulty, take for example a particular coupon bond and try to show how to calculate its yield to maturity.)   [20]

   The yield to maturity is a standard by which credit instruments with various cash flows can be directly compared and we can determine which is the most profitable.

   The yield to maturity of a bond, "i", is the solution of this equation;

   $$P = \frac{C}{1+i} + \frac{C}{(1+i)^2} + \frac{C}{(1+i)^3} + \cdots + \frac{C}{(1+i)^N} + \frac{FV}{(1+i)^N},$$

   where "P", "C", "FV", and "N" represent the price, coupon, face value, and maturity of the bond, respectively.   The yield to maturity as thus defined tells us what interest rate we require in order to get the same time line of cash flow payments as the original instrument by making a simple loan of the same initial payment.

As is clear from the equation, when the price rises, the right hand side must rise to keep equality, which means that the interest rate must decline. Thus, the price of a bond is negatively related with its interest rate.

3. Determine which investment is more profitable, (a) a simple loan with the annual interest rate of 2% or (b) a ¥10,000 face value discount bond maturing in three years that sells for ¥9,600? Be sure to show your algebraic work. [15]

The yield to maturity "i_b" of this discount bond is given by the equation:

$$9,600 = \frac{10,000}{\left(1+i_b\right)^3}.$$

Rearranging the terms yields

$$\left(1+i_b\right)^3 = \frac{10,000}{9,600} = \frac{25}{24} \approx 1.0417. \quad \cdots (1)$$

Since the yield to maturity of the simple loan "i_a" is 0.02, then

$$1+i_a = 1+0.02 = 1.02.$$

Take the cube of both sides of the equation, we obtain

$$\left(1+i_a\right)^3 = 1.02^3 = 1.061208. \quad \cdots (2)$$

From (1) and (2) we have

$$\left(1+i_a\right)^3 > \left(1+i_b\right)^3,$$

which means $i_a > i_b$. Therefore, the simple loan is more profitable than the discount bond.

4. Suppose that people believe that the default risk on firms' bonds has sharply increased in the recession, and suppose that the other conditions remain constant.
   (1) Draw a graph and show what happens to the money market and the interest rate, applying the model of interest rate determination we have set up in the class. Be sure to label your curves and axes. [5]

   M_S represents the supply of money, and M_D^0 and M_D^1 represent the demands

   for money before and after a change in people's belief. i_0 and i_1 stand for the

equilibrium interest rates before and after.

As the graph shows, the demand curve shifts rightward, with the supply curve unchanged, driving up the equilibrium interest rate from i_0 to i_1.

Interest rate

M_S

i_1

i_0

M_D^1

M_D^0

Quantity of money
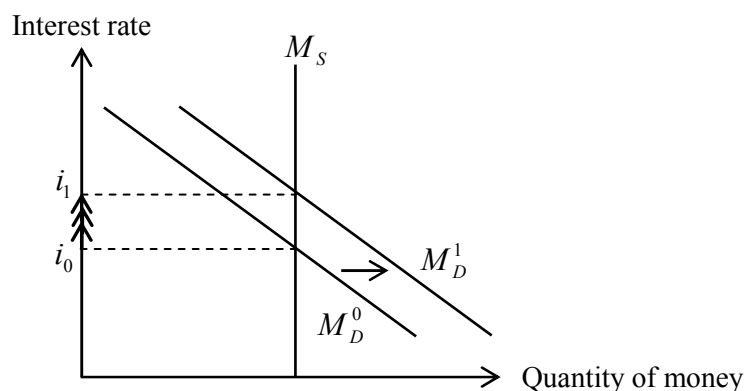
(2) Explain why the curve shifts in the direction it does.   [5]

Because the risk of default on firm's bonds has increased, <u>people don't want to hold as many bonds as before, at the same levels of interest rates</u>.   For example, suppose that, at an interest rate of 2%, they used to hold willingly ¥100 trillion of bonds. But now they are ready to hold only ¥80 trillion at the same interest rate.   This means that they would like to hold more money than before at the same interest rate.

So the quantity of money people want to hold has increased at every level of interest rate, therefore the demand curve shifts to the right.

(3) Describe the process where the market recovers its equilibrium.   [10]

A decrease in the demand for bonds drives down the bond price, causing its interest rate to rise (from their inverse relationship).   <u>As the interest rate rises and the cost of holding money rises, the people try to hold less money by buying bonds, and therefore the demand for bonds begins to increase.</u>   The interest rate continues to rise until the demand for bonds finally equals the supply.   Then there is no excess demand or supply of bonds or money, and the both markets clear again.