

Department of Economics
Johns Hopkins University

Monetary Analysis
Fall 2011

Midterm Exam #2

You have 75 minutes for this exam. There are four questions, with equal weights. Write your answers under the questions, continuing on the back if necessary. The proctors have extra paper if you run out of space.

YOUR NAME _____ ANSWER KEY _____

Question 1

For this question, assume the expectations theory of the term structure.

A. In this part, assume there are no term premia. In 2020, the one-year interest rate is 1.0%. The expected one-year rate is 2.0% in 2021 and 3.0% in 2022. Calculate the two-year and three-year interest rates in 2020. Also, calculate the expectation as of 2020 of the two-year rate in 2021.

$$i_{2(2020)} = 1/2(i_{1(2020)} + E i_{1(2021)}) = 1/2(1\% + 2\%) = 1.5\%$$

$$i_{3(2020)} = 1/3(i_{1(2020)} + E i_{1(2021)} + E i_{1(2022)}) = 1/3(1\% + 2\% + 3\%) = 2\%$$

$$E i_{2(2021)} = 1/2(E i_{1(2021)} + E i_{1(2022)}) = 1/2(2\% + 3\%) = 2.5\%$$

B. Now assume there are term premia. In 2020, the one-year interest rate is 1.0%, the two-year rate is 2.0%, and the three-year rate is 3.0%. The expected one-year rate is 2.0% in 2021 and 3.0% in 2022. Calculate the term premia on two-period and three-period bonds in 2020.

$$\begin{aligned} i_{2(2020)} &= 1/2(i_{1(2020)} + E i_{1(2021)}) + \tau_2 \\ 2\% &= 1/2(1\% + 2\%) + \tau_2 \\ \tau_2 &= 0.5\% \end{aligned}$$

$$\begin{aligned} i_{3(2020)} &= 1/3(i_{1(2020)} + E i_{1(2021)} + E i_{1(2022)}) + \tau_3 \\ 3\% &= 1/3(1\% + 2\% + 3\%) + \tau_3 \\ \tau_3 &= 1\% \end{aligned}$$

Question 2

For each of these statements, say True, False, or Uncertain and briefly explain.

A. If a commercial bank issues new stock, its return on equity falls.

TRUE

ROE = (profits/equity). When an entity issues stock, it's increasing its total equity by letting more savers buy ownership in the bank. The funds raised from selling stock will be used by the bank to either buy securities or issue new loans, which will ultimately increase the bank's interest income and therefore profits. However, the increase in profits will only equal to some percentage of the total equity injection. That is, even though the numerator may be increasing, the denominator is increasing more, so ROE must unambiguously be decreasing.

B. Greater uncertainty about the future value of an asset increases the price of a call option on the asset.

TRUE

Uncertainty means greater variance in the future value of an asset: it could be increasing or decreasing. As long as there is a greater probability of the asset value rising above a call option's strike price, the price of that option must be increasing. That is, the saver who bought the call option has a higher probability of choosing to exercise the option, making it appear more valuable. Likewise, the seller of the option will more likely be obligated to purchase the underlying asset at below market value, therefore he increases the cost of option to compensate for this risk.

C. The financial crisis of 2007-2009 increased the share of commercial-bank assets held by the ten largest banks.

TRUE

Note: the question is asking about the SHARE of assets held by large banks, not the VALUE of assets held by large banks. The financial crisis hurt all banks in the country and decreased everyone's asset values. This caused a large number of smaller banks to become insolvent. Some larger banks were perhaps also insolvent, but some were deemed "too big to fail" and saved from closing. The remaining large financial institutions bought up many smaller, struggling banks resulting in a consolidation of assets held by the largest ten banks.

Question 2

D. In a stock market, the efficient markets hypothesis is most likely to be true, or close to true, if many traders try to beat the market by purchasing undervalued stocks.

TRUE

The efficient markets hypothesis holds that all asset prices will be close to their "true" market value as dictated by the classical theory of asset pricing. Therefore, any asset's price should reflect the market's prevailing expectations about the future payoffs associated with that asset. As these expectations may change over time, the price of the asset must be made to change over time. This occurs efficiently and naturally through the process of traders and analysts attempting to identify "undervalued" assets to purchase. If many traders hold higher expectations about an asset's future payoffs relative to what the current market price would suggest, then they will bid up the price of the asset until it correctly reflects the market's now more optimistic beliefs about that asset's future prospects.

E. Deposit insurance increases the need for bank supervision.

TRUE

Deposit insurance means savers are less likely to be concerned with a bank's investment activities, since they know they will always be able to claim their money even if the banks acts irresponsibly. This creates a problem of moral hazard, in that the banks may now feel freer to make risky investments in the hopes of earning higher profits. From the government's point of view, however, this increases the need for regulatory oversight in order to minimize the costs incurred by the government when having to compensate saver's for a failed bank's irresponsible lending. Furthermore, as evidenced by the recent global financial crisis, overly risk-insensitive bank lending practices can bring about negative consequences for savers in general other than an inability to withdraw deposits.

Question 3

Write an essay explaining the subprime mortgage crisis. What factors explain the rapid rise in subprime lending from the 1990s to 2007? What factors explain the sharp rise in defaults on subprime mortgages over 2007-2010?

The factors explaining the rapid rise in subprime lending:

- housing bubble
- lenders rely on the credit score
- a reduced down payment, even a mortgages with "zero down"
- a "no documentation" policy
- a low introductory interest rate or teaser rate
- gaps in government regulation
- securitization

The factor explaining the sharp rise in defaults on subprime mortgages:

- housing bubble's collapse

Question 4

Suppose a firm can choose between two investment projects, each of which costs \$100. A safe project produces \$125 after a year. A risky project has a one half probability of producing \$150 after a year and a one half probability of producing nothing.

A. Suppose the firm raises \$100 to fund its chosen project by issuing a bond with a promised payment of P after a year. The actual payment is the minimum of P and the amount the firm earns on its project. Assume the firm maximizes its expected profit. For what values of P will the firm choose the safe project?

B. Suppose a saver with \$100 can either purchase a bond from the firm or do something else with the money that produces \$105 after a year. For what values of P will the saver purchase the firm's bond? Show your reasoning.

This is a moral hazard problem (see p. 197 of textbook) and I think that this problem is the challenging one.

a.

The firm will choose the safe project if the expected profit of safe project is higher than that of risky project:

$$125 - P > 1/2 * (150 - P) + 1/2 (0-0) \\ 100 > P$$

Thus, the firm will choose the safe project if $P < 100$.

b.

From previous question we found that if $P < 100$ (payment less than initial investment) then the firm will choose the safe project. As saver can do something else with the return 5%, this implies that the firm will effectively choose the risky project.

Knowing the firm will choose the risky project, the maximum payment that saver can get (from the firm) is 150. Thus the expected payment will be: $1/2 (150) = 75$ which is less than initial investment 100. Hence no bond is sold and neither project is funded.