

<p style="text-align: center;">CHAPTER 4 THE FINANCIAL ENVIRONMENT: MARKETS, INSTITUTIONS, AND INTEREST RATES</p>
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(Difficulty: E = Easy, M = Medium, and T = Tough)

Multiple Choice: Conceptual

Easy:

Financial markets

Answer: d Diff: E

1. The New York Stock Exchange is primarily
- a. A secondary market.
 - b. A physical location auction market.
 - c. An over-the-counter market.
 - d. Statements a and b are correct.
 - e. Statements b and c are correct.

Financial markets

Answer: c Diff: E

2. Which of the following statements is most correct?
- a. The NYSE does not exist as a physical location; rather it represents a loose collection of dealers who trade stock electronically.
 - b. An example of a primary market transaction is buying 100 shares of Wal-Mart stock from your uncle.
 - c. Capital market instruments include long-term debt and common stock.
 - d. Statements b and c are correct.
 - e. Statements a, b, and c are correct.

Financial markets

Answer: d Diff: E

3. Which of the following statements is most correct?
- a. If an investor sells 100 shares of Microsoft to his brother-in-law, this is a primary market transaction.
 - b. Private securities are generally less liquid than publicly traded securities.
 - c. Money markets are where short-term, liquid securities are traded, whereas capital markets represent the markets for long-term debt and common stock.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Financial markets

Answer: d Diff: E

4. Which of the following is a secondary market transaction?

- a. You sell 200 shares of IBM stock in the open market.
- b. You buy 200 shares of IBM stock from your brother.
- c. IBM issues 2 million shares of new stock to the public.
- d. Statements a and b are correct.
- e. All of the statements above are correct.

Financial markets

Answer: c Diff: E

5. Which of the following statements is most correct?

- a. Money markets are markets for long-term debt and common stocks.
- b. Primary markets are markets where existing securities are traded among investors.
- c. A derivative is a security whose value is derived from the price of some other "underlying" asset.
- d. Statements a and b are correct.
- e. Statements b and c are correct.

Financial markets

Answer: c Diff: E N

6. Which of the following statements is most correct?

- a. While the distinctions are blurring, investment banks generally specialize in lending money, whereas commercial banks generally help companies raise capital from other parties.
- b. Money market mutual funds usually invest their money in a well-diversified portfolio of liquid common stocks.
- c. The NYSE operates as an auction market, whereas NASDAQ is an example of a dealer market.
- d. Statements b and c are correct.
- e. All of the statements above are correct.

Capital market instruments

Answer: b Diff: E

7. Which of the following is an example of a capital market instrument?

- a. Commercial paper.
- b. Preferred stock.
- c. U.S. Treasury bills.
- d. Banker's acceptances.
- e. Money market mutual funds.

Money markets

Answer: e Diff: E

8. Money markets are markets for

- a. Foreign currency exchange.
- b. Consumer automobile loans.
- c. Corporate stocks.
- d. Long-term bonds.
- e. Short-term debt securities.

Financial transactions

Answer: a Diff: E

9. Which of the following statements is correct?
- a. The New York Stock Exchange is a physical location auction market.
 - b. Money markets include markets for consumer automobile loans.
 - c. If an investor sells shares of stock through a broker, then it would be a primary market transaction.
 - d. Capital market transactions involve only the purchase and sale of equity securities.
 - e. None of the statements above is correct.

Financial transactions

Answer: a Diff: E

10. You recently sold 100 shares of Microsoft stock to your brother at a family reunion. At the reunion your brother gave you a check for the stock and you gave your brother the stock certificates. Which of the following best describes this transaction?
- a. This is an example of a direct transfer of capital.
 - b. This is an example of a primary market transaction.
 - c. This is an example of an exchange of physical assets.
 - d. This is an example of a money-market transaction.
 - e. Statements a, b, and d are correct. Statement c is incorrect.

Financial transactions

Answer: e Diff: E

11. Which of the following statements is most correct?
- a. If you purchase 100 shares of Disney stock from your brother-in-law, this is an example of a primary market transaction.
 - b. If Disney issues additional shares of common stock, this is an example of a secondary market transaction.
 - c. The NYSE is an example of an over-the-counter market.
 - d. Statements a and b are correct.
 - e. None of the statements above is correct.

Financial transactions

Answer: c Diff: E

12. You recently sold 200 shares of Disney stock to your brother. This is an example of:
- a. A money market transaction.
 - b. A primary market transaction.
 - c. A secondary market transaction.
 - d. A futures market transaction.
 - e. Statements a and b are correct.

Primary market transactions**Answer: e Diff: E**

13. Which of the following are examples of a primary market transaction?
- a. A company issues new common stock.
 - b. A company issues new bonds.
 - c. An investor asks his broker to purchase 1,000 shares of Microsoft common stock.
 - d. All of the statements above are correct.
 - e. Statements a and b are correct.

Risk and return**Answer: d Diff: E**

14. Your uncle would like to limit his interest rate risk and his default risk, but he would still like to invest in corporate bonds. Which of the possible bonds listed below best satisfies your uncle's criteria?
- a. AAA bond with 10 years to maturity.
 - b. BBB perpetual bond.
 - c. BBB bond with 10 years to maturity.
 - d. AAA bond with 5 years to maturity.
 - e. BBB bond with 5 years to maturity.

Yield curve**Answer: a Diff: E**

15. Assume that inflation is expected to steadily decline in the years ahead, but that the real risk-free rate, k^* , is expected to remain constant. Which of the following statements is most correct?
- a. If the expectations theory holds, the Treasury yield curve must be downward sloping.
 - b. If the expectations theory holds, the yield curve for corporate securities must be downward sloping.
 - c. If there is a positive maturity risk premium, the Treasury yield curve must be upward sloping.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Yield curve**Answer: a Diff: E**

16. If the yield curve is downward sloping, what is the yield to maturity on a 10-year Treasury coupon bond, relative to that on a 1-year T-bond?
- a. The yield on the 10-year bond is less than the yield on a 1-year bond.
 - b. The yield on a 10-year bond will always be higher than the yield on a 1-year bond because of maturity risk premiums.
 - c. It is impossible to tell without knowing the coupon rates of the bonds.
 - d. The yields on the two bonds are equal.
 - e. It is impossible to tell without knowing the relative risks of the two bonds.

Yield curve

Answer: c Diff: E

17. Which of the following statements is most correct?

- a. Downward sloping yield curves are inconsistent with the expectations theory.
- b. The shape of the yield curve depends only on expectations about future inflation.
- c. If the expectations theory is correct, a downward sloping yield curve indicates that interest rates are expected to decline in the future.
- d. Statements a and c are correct.
- e. None of the statements above is correct.

Yield curve

Answer: e Diff: E

18. The real risk-free rate of interest, k^* , is expected to remain constant at 3 percent. Inflation is expected to be 3 percent for next year and then 2 percent a year thereafter. The maturity risk premium is zero. Given this information, which of the following statements is most correct?

- a. The yield curve for U.S. Treasury securities is downward sloping.
- b. A 5-year corporate bond has a higher yield than a 5-year Treasury security.
- c. A 5-year corporate bond has a higher yield than a 7-year Treasury security.
- d. Statements a and b are correct.
- e. All of the statements above are correct.

Yield curve

Answer: c Diff: E

19. Which of the following statements is most correct?

- a. If the maturity risk premium (MRP) is greater than zero, the yield curve must be upward sloping.
- b. If the maturity risk premium (MRP) equals zero, the yield curve must be flat.
- c. If interest rates are expected to increase in the future and the maturity risk premium (MRP) is greater than zero, the yield curve will be upward sloping.
- d. If the expectations theory holds, the yield curve will never be downward sloping.
- e. All of the statements above are correct.

Yield curve**Answer: e Diff: E**

20. For the foreseeable future, the real risk-free rate of interest, k^* , is expected to remain at 3 percent. Inflation is expected to steadily increase over time. The maturity risk premium equals $0.1(t - 1)\%$, where t represents the bond's maturity. On the basis of this information, which of the following statements is most correct?
- a. The yield on 10-year Treasury securities must exceed the yield on 2-year Treasury securities.
 - b. The yield on 10-year Treasury securities must exceed the yield on 5-year corporate bonds.
 - c. The yield on 10-year corporate bonds must exceed the yield on 8-year Treasury securities.
 - d. Statements a and b are correct.
 - e. Statements a and c are correct.

Interest rates**Answer: c Diff: E**

21. Which of the following statements is most correct?
- a. If companies have fewer productive opportunities, interest rates are likely to increase.
 - b. If individuals increase their savings rate, interest rates are likely to increase.
 - c. If expected inflation increases, interest rates are likely to increase.
 - d. All of the statements above are correct.
 - e. Statements a and c are correct.

Interest rates**Answer: b Diff: E**

22. Which of the following is likely to increase the level of interest rates in the economy?
- a. Households start saving a larger percentage of their income.
 - b. Corporations step up their plans for expansion and increase their demand for capital.
 - c. The level of inflation is expected to decline.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Interest rates**Answer: d Diff: E N**

23. Which of the following factors are likely to lead to an increase in nominal interest rates?
- a. Households increase their savings rate.
 - b. Companies see an increase in their production opportunities that leads to an increase in the demand for funds.
 - c. There is an increase in expected inflation.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Interest rates**Answer: b Diff: E N**

24. Which of the following statements is most correct?

- a. The yield on a 3-year Treasury bond cannot exceed the yield on a 10-year Treasury bond.
- b. The yield on a 2-year corporate bond will always exceed the yield on a 2-year Treasury bond.
- c. The yield on a 3-year corporate bond will always exceed the yield on a 2-year corporate bond.
- d. Statements b and c are correct.
- e. All of the statements above are correct.

Cost of money**Answer: c Diff: E N**

25. Which of the following is likely to lead to an increase in the cost of funds?

- a. Companies' production opportunities decline, leading to a decline in the demand for funds.
- b. Households save a larger portion of their income.
- c. Households increase the amount of money they borrow from their local banks.
- d. Statements a and b are correct.
- e. Statements a and c are correct.

Expectations theory**Answer: c Diff: E**

26. Assume that the expectations theory describes the term structure of interest rates. Which of the following statements is most correct?

- a. In equilibrium long-term rates equal short term rates.
- b. An upward-sloping yield curve implies that interest rates are expected to decline in the years ahead.
- c. The maturity risk premium is zero.
- d. Statements a and b are correct.
- e. None of the statements above is correct.

Expectations theory**Answer: a Diff: E**

27. The real risk-free rate, k^* , is expected to remain constant at 3 percent per year. Inflation is expected to be 2 percent per year forever. Assume that the expectations theory holds; that is, there is no maturity risk premium. Treasury securities do not require any default risk or liquidity premiums. Which of the following statements is most correct?

- a. The Treasury yield curve is flat and all Treasury securities yield 5 percent.
- b. The Treasury yield curve is upward sloping for the first 10 years, and then downward sloping.
- c. The yield curve for corporate bonds must be flat, but corporate bonds will yield more than 5 percent.
- d. Statements a and c are correct.
- e. Statements b and c are correct.

Expectations theory**Answer: d Diff: E**

28. One-year interest rates are 6 percent. The market expects 1-year rates to be 7 percent one year from now. The market also expects 1-year rates will be 8 percent two years from now. Assume that the expectations theory holds regarding the term structure (that is, the maturity risk premium equals zero). Which of the following statements is most correct?
- a. The yield curve is downward sloping.
 - b. Today's 2-year interest rate is 8 percent.
 - c. Today's 2-year interest rate is 7 percent.
 - d. Today's 3-year interest rate is 7 percent.
 - e. Today's 3-year interest rate is 9 percent.

Expectations theory**Answer: e Diff: E**

29. The real risk-free rate of interest is expected to remain constant at 3 percent for the foreseeable future. However, inflation is expected to steadily increase over the next 20 years, so the Treasury yield curve is upward sloping. Assume that the expectations theory holds. You are considering two corporate bonds: a 5-year corporate bond and a 10-year corporate bond, each of which has the same default risk and liquidity risk. Given this information, which of the following statements is most correct?
- a. Since the expectations theory holds, this implies that 10-year Treasury bonds must have the same yield as 5-year Treasury bonds.
 - b. Since the expectations theory holds, this implies that the 10-year corporate bonds must have the same yield as the 5-year corporate bonds.
 - c. Since the expectations theory holds, this implies that the 10-year corporate bonds must have the same yield as 10-year Treasury bonds.
 - d. The 10-year Treasury bond must have a higher yield than the 5-year corporate bond.
 - e. The 10-year corporate bond must have a higher yield than the 5-year corporate bond.

Medium:**Financial transactions****Answer: d Diff: M**

30. If the Federal Reserve sells \$50 billion of short-term U.S. Treasury securities to the public, other things held constant, what will this tend to do to short-term security prices and interest rates?
- a. Prices and interest rates will both rise.
 - b. Prices will rise and interest rates will decline.
 - c. Prices and interest rates will both decline.
 - d. Prices will decline and interest rates will rise.
 - e. There will be no changes in either prices or interest rates.

Financial transactions**Answer: d Diff: M**

31. Which of the following statements is most correct?

- a. The distinguishing feature between spot markets versus futures markets transactions is the maturity of the investments. That is, spot market transactions involve securities that have maturities of less than one year whereas futures markets transactions involve securities with maturities greater than one year.
- b. Capital market transactions only include preferred stock and common stock transactions.
- c. If General Electric were to issue new stock this year it would be considered a secondary market transaction since the company already has stock outstanding.
- d. Both dealers in Nasdaq and "specialists" in the NYSE hold inventories of stocks.
- e. Statements a and d are correct.

Interest rates**Answer: b Diff: M**

32. Assume interest rates on long-term government and corporate bonds were as follows:

T-bond = 7.72%	A = 9.64%
AAA = 8.72%	BBB = 10.18%

The differences in rates among these issues were caused primarily by

- a. Tax effects.
- b. Default risk differences.
- c. Maturity risk differences.
- d. Inflation differences.
- e. Statements b and d are correct.

Interest rates**Answer: b Diff: M**

33. Which of the following statements is most correct?

- a. The yield on a 3-year Treasury bond cannot exceed the yield on a 10-year Treasury bond.
- b. The expectations theory states that the maturity risk premium for long-term bonds is zero and that differences in interest rates across different maturities are driven by expectations about future interest rates.
- c. Most evidence suggests that the maturity risk premium is zero.
- d. Statements b and c are correct.
- e. None of the statements above is correct.

Interest rates**Answer: a Diff: M**

34. Which of the following statements is most correct?

- a. The yield on a 2-year corporate bond will always exceed the yield on a 2-year Treasury bond.
- b. The yield on a 3-year corporate bond will always exceed the yield on a 2-year corporate bond.
- c. The yield on a 3-year Treasury bond will always exceed the yield on a 2-year Treasury bond.
- d. All of the statements above are correct.
- e. Statements a and c are correct.

Term structure theories**Answer: b Diff: M**

35. Which of the following statements is most correct?

- a. The maturity premiums embedded in the interest rates on U.S. Treasury securities are due primarily to the fact that the probability of default is higher on long-term bonds than on short-term bonds.
- b. Reinvestment rate risk is lower, other things held constant, on long-term than on short-term bonds.
- c. The expectations theory of the term structure of interest rates states that borrowers generally prefer to borrow on a long-term basis while savers generally prefer to lend on a short-term basis, and that as a result, the yield curve is normally upward sloping.
- d. If the maturity risk premium were zero and interest rates were expected to decrease in the future, then the yield curve for U.S. Treasury securities would, other things held constant, have an upward slope.
- e. None of the statements above is correct.

Expectations theory**Answer: e Diff: M**

36. If the expectations theory of the term structure is correct, which of the following statements is most correct?

- a. An upward sloping yield curve implies that interest rates are expected to be lower in the future.
- b. If 1-year Treasury bills have a yield to maturity of 7 percent, and 2-year Treasury bills have a yield to maturity of 8 percent, this implies the market believes that 1-year rates will be 7.5 percent one year from now.
- c. The yield on 5-year corporate bonds should always exceed the yield on 3-year Treasury securities.
- d. Statements a and c are correct.
- e. None of the statements above is correct.

Expectations theory**Answer: a Diff: M**

37. Assume that the expectations theory holds. Which of the following statements about Treasury bill rates is most correct? (2-year rates apply to bonds that will mature in two years, 3-year rates apply to bonds that will mature in 3 years, and so on).
- a. If 2-year rates exceed 1-year rates, then the market expects interest rates to rise.
 - b. If 2-year rates are 7 percent, and 3-year rates are 7 percent, then 5-year rates must also be 7 percent.
 - c. If 1-year rates are 6 percent and 2-year rates are 7 percent, then the market expects 1-year rates to be 6.5 percent in one year.
 - d. Statements a and c are correct.
 - e. Statements b and c are correct.

Expectations theory**Answer: c Diff: M**

38. Which of the following statements is most correct?
- a. The expectations theory of the term structure implies that long-term interest rates should always equal short-term interest rates.
 - b. If the expectations theory of the term structure is correct, an upward sloping yield curve implies a positive maturity risk premium (MRP).
 - c. If the expectations theory of the term structure is correct, an upward sloping yield curve implies that market participants believe that interest rates are going to be higher in the future than they are today.
 - d. Statements a and b are correct.
 - e. Statements b and c are correct.

Expectations theory**Answer: e Diff: M**

39. Which of the following statements is most correct, assuming that the expectations theory is correct?
- a. If the yield curve is upward sloping, the yield on a 2-year corporate bond must be less than the yield on a 5-year Treasury bond.
 - b. If the yield curve is upward sloping, the yield on a 2-year Treasury bond must be less than the yield on a 5-year corporate bond.
 - c. If the yield curve is downward sloping, the yield on a 10-year Treasury bond must be less than the yield on an 8-year corporate bond.
 - d. All of the statements above are correct.
 - e. Statements b and c are correct.

Expectations theory**Answer: c Diff: M**

40. The interest rate on 1-year Treasury securities is 5 percent. The interest rate on 2-year Treasury securities is 6 percent. The expectations theory is assumed to be correct. Which of the following statements is most correct?
- a. The maturity risk premium is positive.
 - b. The market expects that 1-year rates will be 5.5 percent one year from now.
 - c. The market expects that 1-year rates will be 7 percent one year from now.
 - d. The yield curve is downward sloping.
 - e. None of the statements above is correct.

Expectations theory**Answer: d Diff: M**

41. Assume that the expectations theory holds. Which of the following statements is most correct?
- a. The yield curve for both Treasury securities and corporate securities will be flat.
 - b. The yield curve for Treasury securities is flat, but the yield curve for corporate securities is likely to be upward sloping.
 - c. The yield curve for Treasury securities cannot be downward sloping.
 - d. The maturity risk premium is zero.
 - e. If 2-year rates yield more than 1-year rates, investors should not purchase 1-year bonds, and should instead purchase 2-year bonds.

Yield curve**Answer: e Diff: M**

42. Assume that the current yield curve is upward sloping, or normal. This implies that
- a. Short-term interest rates are more volatile than long-term rates.
 - b. Inflation is expected to subside in the future.
 - c. The economy is at the peak of a business cycle.
 - d. Long-term bonds are a better buy than short-term bonds.
 - e. None of the statements above is necessarily implied by the yield curve given.

Yield curve**Answer: e Diff: M**

43. Which of the following is most correct?
- a. If the expectations theory is correct (that is, the maturity risk premium is zero), then an upward-sloping yield curve means that the market believes that interest rates will rise in the future.
 - b. A 5-year corporate bond may have a yield less than a 10-year Treasury bond.
 - c. The yield curve for corporate bonds may be upward sloping even if the Treasury yield curve is flat.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

Yield curve

Answer: a Diff: M

44. Which of the following is most correct?

- a. If the expectations theory is correct, we could see inverted yield curves.
- b. If a yield curve is inverted, short-term bonds have lower yields than long-term bonds.
- c. A positive maturity risk premium increases the likelihood that a yield curve will be inverted.
- d. Statements b and c are correct.
- e. None of the statements above is correct.

Yield curve

Answer: e Diff: M

45. Which of the following statements is most correct?

- a. If the maturity risk premium is zero, the yield curve must be flat.
- b. A 10-year corporate bond must have a higher yield than a 5-year Treasury bond.
- c. A 10-year Treasury bond must have a higher yield than a 5-year Treasury bond.
- d. If the Treasury yield curve is downward sloping, the yield curve for corporate bonds must also be downward sloping.
- e. None of the statements above is correct.

Yield curve

Answer: c Diff: M

46. A bond trader observes the following information:

- The Treasury yield curve is downward sloping.
- There is a positive maturity risk premium.
- There is no liquidity premium.

On the basis of this information, which of the following statements is most correct?

- a. A 10-year corporate bond must have a higher yield than a 5-year Treasury bond.
- b. A 10-year Treasury bond must have a higher yield than a 10-year corporate bond.
- c. A 5-year corporate bond must have a higher yield than a 10-year Treasury bond.
- d. Statements a and c are correct.
- e. All of the statements above are correct.

Yield curve**Answer: d Diff: M N**

47. The real risk-free rate is expected to remain constant over time. Inflation is expected to be 2 percent a year for the next two years, after which time it is expected to average 4 percent a year. There is a positive maturity risk premium on bonds that have a maturity greater than 1 year. Which of the following statements is most correct?
- a. The yield on a 5-year government bond must exceed that of a 2-year government bond.
 - b. The yield on a 5-year corporate bond must exceed that of a 2-year government bond.
 - c. The yield on a 7-year government bond must exceed that of a 5-year corporate bond.
 - d. Statements a and b are correct.
 - e. All of the statements above are correct.

Yield curve**Answer: d Diff: M N**

48. Inflation is expected to increase steadily over the next 10 years. There is also a positive maturity risk premium. The real risk-free rate of interest is expected to remain constant. Which of the following statements is most correct? (Hint: Remember that the default risk premium and the liquidity premium are zero for Treasury securities: $DRP = LP = 0$.)
- a. The yield on 10-year Treasury securities must exceed the yield on 7-year Treasury securities.
 - b. The yield on 10-year corporate bonds must exceed the yield on 10-year Treasury securities.
 - c. The yield on 7-year corporate bonds must exceed the yield on 10-year Treasury securities.
 - d. Statements a and b are correct.
 - e. All of the statements above are correct.

Corporate yield curve**Answer: d Diff: M**

49. Churchill Corporation just issued bonds that will mature in 10 years. George Corporation just issued bonds that will mature in 12 years. Both bonds are standard coupon bonds that cannot be retired early. The two bonds are equally liquid. Which of the following statements is most correct?
- a. If the yield curve for Treasury securities is flat, Churchill's bond will have the same yield as George's bonds.
 - b. If the yield curve for Treasury securities is upward sloping, George's bonds will have a higher yield than Churchill's bonds.
 - c. If the two bonds have the same level of default risk, their yields will also be the same.
 - d. If the Treasury yield curve is upward sloping and Churchill has less default risk than George, then Churchill's bonds will have a lower yield.
 - e. If the Treasury yield curve is downward sloping, George's bonds will have a lower yield.

Multiple Choice: Problems

Easy:

Expected interest rates

Answer: d Diff: E N

50. The real risk-free rate of interest is 3 percent. Inflation is expected to be 4 percent this coming year, jump to 5 percent next year, and increase to 6 percent the year after (Year 3). According to the expectations theory, what should be the interest rate on 3-year, risk-free securities today?

- a. 18%
- b. 12%
- c. 6%
- d. 8%
- e. 10%

Expected interest rates

Answer: a Diff: E

51. One-year government bonds yield 6 percent and 2-year government bonds yield 5.5 percent. Assume that the expectations theory holds. What does the market believe the rate on 1-year government bonds will be one year from today?

- a. 5.00%
- b. 5.50%
- c. 5.75%
- d. 6.00%
- e. 7.00%

Expected interest rates

Answer: a Diff: E

52. Assume that the expectations theory holds, and that liquidity and maturity risk premiums are zero. If the annual rate of interest on a 2-year Treasury bond is 10.5 percent and the rate on a 1-year Treasury bond is 12 percent, what rate of interest should you expect on a 1-year Treasury bond one year from now?

- a. 9.0%
- b. 9.5%
- c. 10.0%
- d. 10.5%
- e. 11.0%

Expected interest rates**Answer: b Diff: E**

53. One-year Treasury bills yield 6 percent, while Treasury notes with 2-year maturities yield 6.7 percent. If the expectations theory holds (that is, the maturity risk premium is zero), what is the market's forecast of what 1-year T-bills will be yielding one year from now?
- a. 6.7%
 - b. 7.4%
 - c. 7.8%
 - d. 8.0%
 - e. 8.2%

Expected interest rates**Answer: b Diff: E**

54. Two-year Treasury securities yield 6.7 percent, while 1-year Treasury securities yield 6.3 percent. Assume that the maturity risk premium (MRP) equals zero. What does the market anticipate will be the yield on 1-year Treasury securities one year from now?
- a. 6.7%
 - b. 7.1%
 - c. 13.0%
 - d. 6.5%
 - e. 10.2%

Expected interest rates**Answer: c Diff: E**

55. One-year Treasury securities yield 5 percent, 2-year Treasury securities yield 5.5 percent, and 3-year Treasury securities yield 6 percent. Assume that the expectations theory holds. What does the market expect will be the yield on 1-year Treasury securities two years from now?
- a. 6.0%
 - b. 6.5%
 - c. 7.0%
 - d. 7.5%
 - e. 8.0%

Expected interest rates**Answer: c Diff: E N**

56. The real risk-free rate of interest, k^* , is 4 percent, and it is expected to remain constant over time. Inflation is expected to be 2 percent per year for the next three years, after which time inflation is expected to remain at a constant rate of 5 percent per year. The maturity risk premium is equal to $0.1(t - 1)\%$, where t = the bond's maturity. What is the yield on a 10-year Treasury bond?
- a. 8.1%
 - b. 8.9%
 - c. 9.0%
 - d. 9.1%
 - e. 9.9%

Expected interest rates**Answer: d Diff: E N**

57. You observe the following yield curve for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	5.5%
2 years	5.8
3 years	6.0
4 years	6.3
5 years	6.5

Assume that the pure expectations hypothesis holds. What does the market expect will be the yield on 4-year securities, 1 year from today?

- a. 6.00%
- b. 6.30%
- c. 6.40%
- d. 6.75%
- e. 7.30%

Inflation rate**Answer: c Diff: E**

58. Given the following data, find the expected rate of inflation during the next year.

- k^* = real risk-free rate = 3%.
- Maturity risk premium on 10-year T-bonds = 2%. It is zero on 1-year bonds, and a linear relationship exists.
- Default risk premium on 10-year, A-rated bonds = 1.5%.
- Liquidity premium = 0%.
- Going interest rate on 1-year T-bonds = 8.5%.

- a. 3.5%
- b. 4.5%
- c. 5.5%
- d. 6.5%
- e. 7.5%

Inflation rate**Answer: d Diff: E**

59. Suppose that the annual expected rates of inflation over each of the next five years are 5 percent, 6 percent, 9 percent, 13 percent, and 12 percent, respectively. What is the average expected inflation rate over the 5-year period?

- a. 6%
- b. 7%
- c. 8%
- d. 9%
- e. 10%

Default risk premium**Answer: b Diff: E N**

60. The real risk-free rate, k^* , is 3 percent. Inflation is expected to average 2 percent a year for the next three years, after which time inflation is expected to average 3.5 percent a year. Assume that there is no maturity risk premium. A 7-year corporate bond has a yield of 7.6 percent. Assume that the liquidity premium on the corporate bond is 0.4 percent. What is the default risk premium on the corporate bond?
- a. 0.70%
 - b. 1.34%
 - c. 1.45%
 - d. 2.01%
 - e. 2.20%

Medium:**Expected interest rates****Answer: c Diff: M**

61. You are given the following data:

- k^* = real risk-free rate = 4%.
- Constant inflation premium = 7%.
- Maturity risk premium = 1%.
- Default risk premium for AAA bonds = 3%.
- Liquidity premium for long-term T-bonds = 2%.

Assume that a highly liquid market does not exist for long-term T-bonds, and the expected rate of inflation is a constant. Given these conditions, the nominal risk-free rate for T-bills is _____, and the rate on long-term Treasury bonds is _____.

- a. 4%; 14%
- b. 4%; 15%
- c. 11%; 14%
- d. 11%; 15%
- e. 11%; 17%

Expected interest rates**Answer: b Diff: M**

62. Drongo Corporation's 4-year bonds currently yield 7.4 percent. The real risk-free rate of interest, k^* , is 2.7 percent and is assumed to be constant. The maturity risk premium (MRP) is estimated to be $0.1\%(t - 1)$, where t is equal to the time to maturity. The default risk and liquidity premiums for this company's bonds total 0.9 percent and are believed to be the same for all bonds issued by this company. If the average inflation rate is expected to be 5 percent for years 5, 6, and 7, what is the yield on a 7-year bond for Drongo Corporation?
- a. 8.70%
 - b. 8.34%
 - c. 7.40%
 - d. 9.20%
 - e. 8.54%

Expected interest rates**Answer: b Diff: M**

63. The real risk-free rate is expected to remain constant at 3 percent. Inflation is expected to be 2 percent a year for the next 3 years, and then 4 percent a year thereafter. The maturity risk premium is $0.1\%(t - 1)$, where t equals the maturity of the bond. (The maturity risk premium on a 5-year bond is 0.4 percent.) A 5-year corporate bond has a yield of 8.4 percent. What is the yield on a 7-year corporate bond that has the same default risk and liquidity premiums as the 5-year corporate bond?
- a. 8.73%
 - b. 8.94%
 - c. 8.65%
 - d. 7.98%
 - e. 9.24%

Expected interest rates**Answer: b Diff: M**

64. The real risk-free rate of interest, k^* , is 3 percent. Inflation is expected to be 4 percent this year, 5 percent next year, and 3 percent per year thereafter. The maturity risk premium equals $0.1\%(t - 1)$, where t equals the bond's maturity. That is, a 5-year bond has a maturity risk premium of 0.4 percent or 0.004. A 5-year corporate bond yields 8 percent. What is the yield on a 10-year corporate bond that has the same default risk and liquidity premiums as the 5-year corporate bond?
- a. 7.2%
 - b. 8.2%
 - c. 8.0%
 - d. 6.8%
 - e. 8.4%

Expected interest rates**Answer: d Diff: M**

65. The real risk-free rate of interest, k^* , equals 2 percent. Inflation is expected to be 2 percent per year over the next five years and then 3 percent per year thereafter. The maturity risk premium (MRP) equals $0.05\%(t - 1)$, where t = the maturity of the bond. A 10-year corporate bond has a yield of 7.8 percent. A 12-year corporate bond has the same default risk and liquidity premiums as the 10-year corporate bond. What is the yield on the 12-year bond?
- a. 7.48%
 - b. 7.90%
 - c. 8.50%
 - d. 7.98%
 - e. 8.30%

Expected interest rates**Answer: b Diff: M**

66. Assume that $k^* = 2.0\%$; the maturity risk premium is found as $MRP = 0.1\%(t - 1)$, where t = years to maturity; the default risk premium for corporate bonds is found as $DRP = 0.05\%(t - 1)$; the liquidity premium is 1 percent for corporate bonds only; and inflation is expected to be 3 percent, 4 percent, and 5 percent during the next three years and then 6 percent thereafter. What is the difference in interest rates between 10-year corporate and Treasury bonds?
- a. 0.45%
 - b. 1.45%
 - c. 2.20%
 - d. 2.75%
 - e. 3.25%

Expected interest rates**Answer: a Diff: M**

67. Three-year Treasury securities currently yield 6 percent, while 4-year Treasury securities currently yield 6.5 percent. Assume that the expectations theory holds. What does the market believe the rate will be on 1-year Treasury securities three years from now?
- a. 8.0%
 - b. 8.5%
 - c. 9.0%
 - d. 9.5%
 - e. 10.0%

Expected interest rates**Answer: d Diff: M**

68. One-year Treasury securities yield 6.9 percent, while 2-year Treasury securities yield 7.2 percent. If the expectations theory is correct (that is, the maturity risk premium is zero) what does the market anticipate will be the yield on 1-year Treasury securities one year from now?
- a. 6.0%
 - b. 6.7%
 - c. 7.2%
 - d. 7.5%
 - e. 8.0%

Expected interest rates**Answer: d Diff: M**

69. You observe the following yields on Treasury securities of various maturities:

<u>Maturity</u>	<u>Yield</u>
1 year	6.0%
3 years	6.4
6 years	6.5
9 years	6.8
12 years	7.0
15 years	7.2

Using the expectations theory, forecast the interest rate on 9-year Treasuries, six years from now. (That is, what will be the yield on 9-year Treasuries, issued in 6 years' time?)

- a. 6.50%
- b. 6.65%
- c. 6.80%
- d. 7.67%
- e. 8.00%

Expected interest rates**Answer: d Diff: M**

70. You observe the following yield curve for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	6.2%
2 years	6.4
3 years	6.7
4 years	6.9
5 years	7.1

Assume that the expectations theory is correct. What does the market expect the interest rate on 3-year securities to be 1 year from now?

- a. 6.67%
- b. 6.70%
- c. 6.90%
- d. 7.13%
- e. 7.50%

Expected interest rates**Answer: d Diff: M**

71. You observe the following yield curve for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	4.6%
2 years	4.8
3 years	4.9
4 years	4.8
5 years	5.2

Assume that the expectations theory holds. What does the market expect the interest rate on 1-year securities to be four years from today?

- a. 4.8%
- b. 5.2%
- c. 5.6%
- d. 6.8%
- e. 35.4%

Expected interest rates**Answer: b Diff: M**

72. Currently, 3-year Treasury securities yield 5.4 percent, 7-year Treasury securities yield 5.8 percent, and 10-year Treasury securities yield 6.2 percent. If the expectations theory is correct, what does the market expect will be the yield on 3-year Treasury securities seven years from today?

- a. 6.54%
- b. 7.13%
- c. 5.80%
- d. 4.58%
- e. 5.68%

Expected interest rates**Answer: d Diff: M**

73. Three-year treasury securities yield 5 percent, 5-year treasury securities yield 6 percent, and 8-year treasury securities yield 7 percent. If the expectations theory is correct, what is the expected yield on 5-year Treasury securities three years from now?

- a. 5.0%
- b. 7.0%
- c. 6.7%
- d. 8.2%
- e. 6.0%

Expected interest rates**Answer: c Diff: M**

74. In the market today, you observe the following yields on Treasury securities:

<u>Maturity</u>	<u>Yield</u>
3 years	6.2%
5 years	5.9
8 years	5.7

Assume that the expectations theory holds. What does the market expect the yield on 3-year Treasury securities to be five years from today?

- a. 5.50%
- b. 6.01%
- c. 5.37%
- d. 5.70%
- e. 9.00%

Expected interest rates**Answer: e Diff: M**

75. You observe the following yield curve for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	5.6%
2 years	5.8
5 years	6.2
7 years	6.6
9 years	6.8

Assuming that the expectations theory holds, what does the market expect the yield on 2-year Treasury securities to be five years from today?

- a. 5.80%
- b. 6.20%
- c. 6.60%
- d. 6.92%
- e. 7.60%

Expected interest rates**Answer: b Diff: M**

76. You observe the following term structure for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	5.1%
2 years	5.4
3 years	5.6
4 years	5.7
5 years	6.0

Assume that the expectations theory holds. What does the market expect will be the yield on 2-year Treasury securities three years from today?

- a. 5.4%
- b. 6.6%
- c. 6.8%
- d. 7.6%
- e. 5.8%

Expected interest rates**Answer: d Diff: M**

77. A fixed-income analyst has made the following assessments:

- The real risk-free rate is expected to remain at 2.5 percent for the next 10 years.
- Inflation is expected to be 3 percent this year, 4 percent next year, and 5 percent a year thereafter.
- The maturity risk premium is $0.1\%(t - 1)$, where t = the maturity of the bond (in years).

A 5-year corporate bond currently yields 8.5 percent. What will be the yield on the bond, one year from now, if the above assessments are correct, and the bond's default premium and liquidity premium remain unchanged?

- a. 7.30%
- b. 8.40%
- c. 8.50%
- d. 8.75%
- e. 8.85%

Expected interest rates**Answer: b Diff: M**

78. The real risk-free rate of interest is 3 percent. The market expects that inflation will be 3 percent each year for the next 5 years, and then will average 5 percent a year thereafter. The maturity risk premium is estimated to be $MRP_t = 0.1\%(t - 1)$. In other words, the maturity risk premium on a 2-year security is 0.1 percent or 0.001. What is the yield on a Treasury bond that matures in 12 years?
- a. 8.10%
 - b. 8.27%
 - c. 8.45%
 - d. 8.53%
 - e. 8.68%

Expected interest rates**Answer: c Diff: M**

79. The real risk-free rate of interest is 2 percent. The market expects that inflation will be 3 percent each year for the next five years, and then will average 5 percent a year thereafter. The maturity risk premium is estimated to be $MRP_t = 0.1\%(t - 1)$. In other words, the maturity risk premium on a 2-year security is 0.1 percent or 0.001. A 10-year corporate bond yields 8.6 percent. What is the yield on an 8-year corporate bond that has the same default risk and liquidity as the 10-year bond?
- a. 6.45%
 - b. 7.90%
 - c. 8.15%
 - d. 8.42%
 - e. 8.60%

Expected interest rates**Answer: b Diff: M**

80. Ten-year bonds have an interest rate of 6.5 percent, while 15-year bonds have an interest rate of 6.0 percent. If the expectations theory is correct, what does the market believe will be the interest rate on 5-year bonds, 10 years from now?
- a. 5.50%
 - b. 5.00%
 - c. 12.50%
 - d. 6.25%
 - e. 7.00%

Expected interest rates**Answer: b Diff: M**

81. The real risk-free rate, k^* , is expected to remain constant at 3 percent. Inflation is expected to average 2 percent per year for the next five years and then 3 percent per year thereafter. The maturity risk premium equals $0.1\%(t - 1)$, where t = the bond's maturity. (The MRP of a 3-year security is 0.2 percent, or 0.002). Currently, a 10-year corporate bond has a yield of 7.8 percent. What is the yield on a 15-year corporate bond that has the same default risk and liquidity premiums as the 10-year corporate bond?

- a. 8.30%
- b. 8.47%
- c. 8.57%
- d. 8.80%
- e. 9.80%

Expected interest rates**Answer: b Diff: M**

82. Assume that the current interest rate on a 1-year bond is 8 percent, the current rate on a 2-year bond is 10 percent, and the current rate on a 3-year bond is 12 percent. If the expectations theory is correct, what is the 1-year interest rate expected during Year 3?

- a. 12.0%
- b. 16.0%
- c. 13.5%
- d. 10.5%
- e. 14.0%

Expected interest rates**Answer: a Diff: M N**

83. You observe the following yield curve for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	6.0%
2 years	5.8
3 years	5.5
4 years	5.6
5 years	5.8

Assume that the expectations theory holds. What does the market expect that three-year interest rates will be one year from today?

- a. 5.47%
- b. 5.50%
- c. 5.60%
- d. 5.87%
- e. 5.90%

Expected interest rates**Answer: a Diff: M N**

84. You observe the following yield curve for Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	5.8%
2 years	6.2
3 years	6.5
4 years	6.2
5 years	6.0

Assume that the expectations theory is correct. What does the market expect the rate on two-year Treasury securities will be three years from today?

- a. 5.25%
- b. 6.20%
- c. 6.00%
- d. 5.87%
- e. 6.50%

Expected interest rates**Answer: b Diff: M N**

85. You observe the following yield curve for U.S. Treasury securities:

<u>Maturity</u>	<u>Yield</u>
1 year	5.2%
2 years	5.5
3 years	5.8
4 years	6.3
5 years	6.3

Assume that the pure expectations hypothesis holds. What does the market expect will be the yield on three-year Treasury securities, one year from today?

- a. 6.46%
- b. 6.67%
- c. 6.98%
- d. 7.34%
- e. 7.80%

Expected interest rates**Answer: c Diff: M N**

86. The real risk-free rate is expected to remain constant at 3 percent. Inflation is expected to be 4 percent a year for the next four years, and then 3 percent a year thereafter. The maturity risk premium is $0.1(t - 1)\%$, where t equals the maturity of the bond. (The maturity risk premium on a 5-year bond is 0.4 percent or 0.004.) A 7-year corporate bond has a yield of 9.8 percent (0.098). What is the yield on a 10-year corporate bond that has the same default risk premium and liquidity premium as the 7-year corporate bond?
- a. 9.63%
 - b. 9.73%
 - c. 9.93%
 - d. 10.03%
 - e. 10.15%

Real risk-free rate of interest**Answer: d Diff: M**

87. You read in *The Wall Street Journal* that 30-day T-bills are currently yielding 8 percent. Your brother-in-law, a broker at Kyoto Securities, has given you the following estimates of current interest rate premiums:
- Inflation premium = 5%.
 - Liquidity premium = 1%.
 - Maturity risk premium = 2%.
 - Default risk premium = 2%.

On the basis of these data, the real risk-free rate of return is

- a. 0%
- b. 1%
- c. 2%
- d. 3%
- e. 4%

Inflation rate**Answer: c Diff: M**

88. A 10-year Treasury bond currently yields 7 percent. The real risk-free rate of interest, k^* , is 3.1 percent. The maturity risk premium has been estimated to be $0.1\%(t - 1)$, where t = the maturity of the bond. (For a 3-year bond the maturity risk premium is 0.2 percent or 0.002.) Inflation is expected to average 2.5 percent a year for each of the next five years. What is the expected average rate of inflation between years five and ten?
- a. 2.5%
 - b. 3.0%
 - c. 3.5%
 - d. 4.0%
 - e. 4.5%

Inflation rate**Answer: b Diff: M**

89. Assume that a 3-year Treasury note has no maturity risk premium, and that the real risk-free rate of interest is 3 percent. If the T-note carries a yield to maturity of 13 percent, and if the expected average inflation rate over the next 2 years is 11 percent, what is the implied expected inflation rate during Year 3?
- a. 7%
 - b. 8%
 - c. 9%
 - d. 17%
 - e. 18%

Inflation rate**Answer: d Diff: M**

90. *The Wall Street Journal* quotes the yield on 5-year Treasury bonds as 5.4 percent. Also, the current 1-year Treasury bond has a yield of 5 percent. If the real risk-free rate is 3 percent and is expected to remain constant, and the expectations theory is correct, what is the average annual expected inflation for the 4-year period during Years 2 through 5?
- a. 0.63%
 - b. 5.50%
 - c. 1.10%
 - d. 2.50%
 - e. 0.50%

Inflation rate**Answer: b Diff: M**

91. The real risk-free rate, k^* , is 3 percent. Two-year Treasury securities yield 6.5 percent, while 3-year Treasury securities yield 7 percent. The Treasury securities have a maturity risk premium $= 0.1\%(t - 1)$, where t = the maturity of the security. Assume that the default risk premium and liquidity premium on all Treasury securities equals zero. The expected inflation rate for this next year (Year 1) is 3.25 percent. What does the market anticipate will be the inflation rate three years from now?
- a. 3.55%
 - b. 4.60%
 - c. 5.00%
 - d. 5.25%
 - e. 5.50%

Inflation rate**Answer: b Diff: M**

92. The real risk-free rate is expected to remain at 3 percent. Inflation is expected to be 3 percent this year and 4 percent next year. The maturity risk premium is estimated to be equal to $0.1\%(t - 1)$, where t = the maturity of a bond (in years). All Treasury securities are highly liquid, and therefore have no liquidity premium. Three-year Treasury bonds yield 0.5 percentage points (0.005) more than 2-year Treasury bonds (that is, 2-year bond yield plus 0.5%). What is the expected level of inflation in Year 3?
- a. 4.5%
 - b. 4.7%
 - c. 5.0%
 - d. 5.6%
 - e. 6.3%

Inflation rate**Answer: a Diff: M**

93. A 5-year corporate bond has an 8 percent yield. A 10-year corporate bond has a 9 percent yield. The two bonds have the same default risk premium and liquidity premium. The real risk-free rate, k^* , is expected to remain constant at 3 percent. Inflation is expected to be 3 percent a year for the next five years. After five years, inflation is expected to be constant at some rate, X , which may or may not be 3 percent. The maturity risk premium equals $0.1\%(t - 1)$, where t equals time until the bond's maturity. In other words, the maturity risk premium on the 5-year bond is 0.4 percent or 0.004. What is the market's expectation today of the average level of inflation for Years 6 through 10, that is, what is X ?
- a. 4.0%
 - b. 6.0%
 - c. 1.5%
 - d. 0.9%
 - e. 7.0%

Inflation rate**Answer: e Diff: M**

94. Assume that today is January 1, 2003. A 5-year corporate bond maturing on January 1, 2008, has a yield to maturity of 7.5 percent. A 10-year corporate bond maturing on January 1, 2013, with the same liquidity and default risk premiums as the 5-year corporate bond has a yield to maturity of 8.2 percent. The annual real risk-free rate of interest, k^* , is expected to remain constant at 2 percent. The maturity risk premium equals $0.1\%(t - 1)$, where t = the bond's maturity in years. (For example, the maturity risk premium on a 5-year bond is 0.4 percent or 0.004.) Inflation is expected to average 2 percent per year for the next five years. What is the average annual expected inflation between January 2008 and January 2013?
- a. 2.2%
 - b. 0.2%
 - c. 3.4%
 - d. 0.6%
 - e. 2.4%

Default risk premium**Answer: a Diff: M**

95. The 10-year bonds of Gator Corporation are yielding 8 percent per year. Treasury bonds with the same maturity are yielding 6.4 percent per year. The real risk-free rate (k^*) has not changed in recent years and is 3 percent. The average inflation premium is 2.5 percent and the maturity risk premium takes the form: $MRP = 0.1\%(t - 1)$, where t = number of years to maturity. If the liquidity premium is 0.5 percent, what is the default risk premium on the corporate bond?
- a. 1.1%
 - b. 2.5%
 - c. 1.2%
 - d. 0.7%
 - e. 1.6%

Maturity risk premium**Answer: d Diff: M**

96. The real risk-free rate is 2 percent. The inflation rate is expected to be 3 percent a year for the next three years and then 4 percent a year thereafter. Assume that the default risk and liquidity premiums on all Treasury securities equal zero. You observe that 10-year Treasury bonds yield 1 percent more than the yield on 5-year Treasury bonds. What is the difference in the maturity risk premium on the two bonds? (That is, what is $MRP_{10} - MRP_5$?)
- a. 0.1%
 - b. 0.3%
 - c. 0.5%
 - d. 0.7%
 - e. 1.0%

Maturity risk premium**Answer: a Diff: M**

97. An investor in Treasury securities expects inflation to be 3 percent in Year 1, 4 percent in Year 2, and 5 percent each year thereafter. Assume that the real risk-free rate is 3 percent, and that this rate will remain constant over time. Two-year Treasury securities yield 6.8 percent, while 4-year Treasury securities yield 7.6 percent. What is the difference in the maturity risk premiums (MRPs) on the two securities, that is, what is $MRP_4 - MRP_2$?

- a. 0.05%
- b. 0.10%
- c. 0.15%
- d. 0.80%
- e. 0.90%

Maturity risk premium**Answer: d Diff: M**

98. The real risk-free rate is 3 percent. The inflation rate is expected to be 4 percent for the next two years, 4.5 percent for Years 3 and 4, and 5 percent for each year thereafter. The liquidity and default risk premiums are equal to zero for Treasury securities. The 6-year Treasury bonds yield 0.6 percent more than 4-year Treasury bonds, and the maturity risk premium on the 6-year Treasury bonds (MRP_6) is 0.9 percent. What is the maturity risk premium on the 4-year Treasury bonds (MRP_4)?

- a. 0.60%
- b. 0.25%
- c. 0.30%
- d. 0.55%
- e. 0.44%

Multiple Part:

(The following information applies to the next two problems.)

Looking in today's newspaper, you observe the following yield curve information:

<u>Maturity</u>	<u>Yield</u>
1 year	5.0%
2 years	5.5
3 years	6.0
4 years	???
5 years	7.0

Expected interest rates**Answer: c Diff: E N**

99. If the pure expectations hypothesis holds, what does the market expect that the one-year rate will be one year from now?

- a. 5.0%
- b. 5.5%
- c. 6.0%
- d. 6.5%
- e. 7.0%

Expected interest rates**Answer: e Diff: E N**

100. Assume that the pure expectations hypothesis holds and that the market expects that the one-year rate will be 7.2 percent four years from today. What is the four-year rate today?

- a. 5.20%
- b. 6.20%
- c. 6.50%
- d. 6.80%
- e. 6.95%

(The following information applies to the next two problems.)

A 5-year Treasury bond has a 5 percent yield. A 10-year Treasury bond has a 6 percent yield. A 10-year corporate bond has an 8 percent yield. The market expects that inflation will average 2.5 percent over the next 10 years ($IP_{10} = 2.5\%$). Assume that there is no maturity risk premium ($MRP = 0$), and that the annual real risk-free rate of interest, k^* , will remain constant over the next 10 years. (Hint: Remember that the default risk premium and the liquidity premium are zero for Treasury securities: $DRP = LP = 0$).

Average inflation**Answer: b Diff: M N**

101. What does the market expect that inflation will average over the next five years?

- a. 1.0%
- b. 1.5%
- c. 2.0%
- d. 2.5%
- e. 3.5%

Expected interest rates**Answer: c Diff: M N**

102. A 5-year corporate bond has the same default risk premium and liquidity premium as the 10-year corporate bond described above. What is the yield on this 5-year corporate bond?

- a. 6.0%
- b. 6.5%
- c. 7.0%
- d. 7.5%
- e. 8.0%

(The following information applies to the next two problems.)

Assume that the real risk-free rate of interest, k^* , equals 3 percent, and it is expected to be constant over time. Expected inflation is expected to be 3 percent in Year 1, 4 percent in Year 2, and 5 percent in Year 3. Assume that the maturity risk premium (MRP) = 0.

Expected interest rates**Answer: c Diff: E N**

103. What is the interest rate on Treasury securities that mature in three years?

- a. 6.0%
- b. 6.5%
- c. 7.0%
- d. 7.5%
- e. 8.0%

Expected inflation**Answer: e Diff: E N**

104. The interest rate on Treasury securities that mature in four years is 8 percent. What is expected inflation in Year 4?

- a. 3.0%
- b. 5.0%
- c. 6.0%
- d. 7.0%
- e. 8.0%

(The following information applies to the following two problems.)

Assume that the pure expectations hypothesis is correct. (That is, the maturity risk premium (MRP) equals zero.) The current term structure of interest rates for Treasury securities is as follows:

<u>Maturity</u>	<u>Yield</u>
1 year	6.0%
2 years	6.5
5 years	7.0
10 years	7.5
15 years	7.2
20 years	6.5

Expected interest rates**Answer: a Diff: M N**

105. What does the market think will be the yield on 5-year Treasury securities 10 years from now?

- a. 6.60%
- b. 6.95%
- c. 7.05%
- d. 7.50%
- e. 8.10%

Expected interest rates**Answer: d Diff: M N**

106. The market thinks that two years from now, the rate on one-year Treasury securities will be 6.8 percent. What does the market think the rate will be on two-year Treasury securities one year from now?

- a. 6.6%
- b. 6.7%
- c. 6.8%
- d. 6.9%
- e. 7.0%

CHAPTER 4

ANSWERS AND SOLUTIONS

1. **Financial markets** **Answer: d Diff: E**

2. **Financial markets** **Answer: c Diff: E**

Statement a is false; this describes the over-the-counter market. Statement b is false; this is a secondary market transaction. Statement c is true; therefore, the other statements are false.

3. **Financial markets** **Answer: d Diff: E**

Statement d is the correct choice, because both statements b and c are correct. Statement a is incorrect; this is a secondary market transaction.

4. **Financial markets** **Answer: d Diff: E**

Statements a and b are both secondary market transactions; one is a private transaction, and one is public, but they both occur on the secondary market. Therefore, statements a and b are true. Statement c is false because this is a primary market transaction. (It is the first time these shares have been offered.) Since statements a and b are both true, statement d is the correct choice.

5. **Financial markets** **Answer: c Diff: E**

Statement a is false; money markets are the markets for short-term, highly-liquid debt securities. Statement b is false; primary markets are the markets where corporations raise new capital. Statement c is true; this is the definition of a derivative.

6. **Financial markets** **Answer: c Diff: E N**

The correct answer is statement c. Statement a is incorrect; investment banks (such as Goldman Sachs or Dean Witter) specialize in helping firms raise external capital, while commercial banks are more active in lending money. Statement b is incorrect; money market funds typically invest their funds in short-term, liquid, low-risk debt securities. A list of money market instruments can be found in Chapter 5 of the textbook.

7. **Capital market instruments** **Answer: b Diff: E**

The capital market is the market for long-term debt and corporate stock. The only long-term instrument in the choices given is preferred stock.

8. **Money markets** **Answer: e Diff: E**

9. Financial transactions

Answer: a Diff: E

Statement a is correct; the other statements are false. Consumer auto loans typically have maturities in excess of one year. Money markets are the markets for debt securities with maturities of less than one year. If an investor sells shares through a broker, this is a secondary market transaction. The purchase and sale of long-term debt is also a capital market transaction.

10. Financial transactions

Answer: a Diff: E

This is a secondary market transaction, while the stock exchanged is a financial capital asset.

11. Financial transactions

Answer: e Diff: E

12. Financial transactions

Answer: c Diff: E

Selling Disney stock is an example of a secondary market transaction.

13. Primary market transactions

Answer: e Diff: E

Statement c is a secondary market transaction.

14. Risk and return

Answer: d Diff: E

15. Yield curve

Answer: a Diff: E

If the expectations theory holds, the Treasury yield curve must be downward sloping. Since everyone is expecting inflation to be declining, then the average inflation rate for the next 5 years will be less than the average inflation rate for this year. Therefore, the IP will decline as maturity increases, and statement a is true.

We cannot say for sure that the yield curve for corporate securities must be downward sloping if the expectations theory holds because both the MRP and DRP increase with time. If the fall in inflation is small, but the increase in MRP and DRP through time is large, the yield curve for corporate securities may be upward sloping. Therefore, statement b is false.

Statement c depends on the relative magnitudes of the two premiums that affect Treasuries, MRP and IP. If the decline in IP is greater than the increase in MRP, then the yield curve will still be downward sloping. Therefore, statement c is false.

16. Yield curve

Answer: a Diff: E

17. Yield curve

Answer: c Diff: E

The shape of the yield curve depends primarily on two factors: (1) expectations about future inflation and (2) the relative riskiness of securities with different maturities.

18. Yield curve

Answer: e Diff: E

The required return on treasuries is: $k = k^* + IP + MRP$. Since $MRP = 0$, $k = k^* + IP$. Longer-term treasuries will have lower yields than shorter-term treasuries as the IP (inflation premium) is declining over time. So, statement a is correct. A corporate bond of equal maturity to a treasury bond will always have a higher yield because of the default risk on the corporate bond. So statement b is correct. From statements a and b, statement c is correct also.

19. Yield curve

Answer: c Diff: E

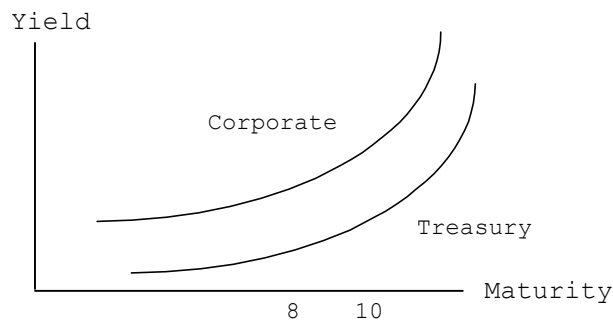
The maturity risk premium (MRP) and the expectations of future interest rates determine the shape of the yield curve. Therefore, statements a and b are false since they ignore interest rate expectations. Statement d is false; it is entirely possible to have a downward-sloping yield curve under the expectations theory.

20. Yield curve

Answer: e Diff: E

The required return on Treasuries is $k = k^* + IP + MRP$. Inflation increases, so the IP on a 10-year Treasury is higher than the IP on a 2-year Treasury. Also, $MRP = 0.1\%(t - 1)$. MRP on the 2-year Treasury = $0.1\%(2 - 1) = 0.1\%$. MRP on the 10-year Treasury = $0.1\%(10 - 1) = 0.9\%$. Therefore, both the MRP and the IP on the 10-year Treasury exceed the MRP and the IP on the 2-year Treasury, so the overall yield on the 10-year Treasury must be higher than the yield on the 2-year Treasury. Therefore, statement a is true.

$k(\text{Treasury}) = k^* + IP + MRP$. $k(\text{Corporate}) = k^* + IP + DRP + LP + MRP$. Since the corporate bond has the extra risk premia, it will have a higher yield for two bonds of the same maturity, but in statement b the bonds have different maturities, so we cannot say for sure that this is true or false. Therefore, statement b is false.



Since we know that the corporate bond has to have a higher yield than the Treasury bond for all bonds of the same maturity, we know the yield curve for the corporate bond must be higher than the yield curve for the Treasury bond. We also know that the yield curve is upward sloping because inflation steadily increases over time. If you look at the graph, it's obvious that statement c must be true. Since statements a and c are both true, then statement e is the correct choice.

21. Interest rates

Answer: c Diff: E

22. Interest rates

Answer: b Diff: E

The correct answer is statement b. If savings increase, money available to lend increases (in other words, supply increases). This would cause interest rates to decrease. Or, you can view this as the demand for money decreases, which also causes interest rates to decrease. So, statement a is incorrect. An increase in borrowing has the exact opposite effect. The demand increases, so interest rates increase. Thus, statement b is correct. Since $k = k^* + IP + DRP + LP + MRP$, if IP decreases, k decreases. So statement c is incorrect.

23. Interest rates

Answer: d Diff: E N

The correct answer is statement d. An increase in household savings increases money available, shifting the supply curve to the right, causing interest rates to fall. So, statement a is incorrect. Both statements b and c are correct. An increase in demand will increase interest rates, and an increase in expected inflation will increase interest rates. So, statement d is the correct choice.

24. Interest rates

Answer: b Diff: E N

The correct answer is statement b. Both statements a and c are incorrect because expected inflation can be positive, zero, or negative. Without further information on the expected future inflation rate, statements a and c cannot be evaluated. For statement b, both bonds have the same expected inflation. A corporate bond always has some default risk premium, while the Treasury bond does not, so the yield on the 2-year corporate bond must exceed the yield on the 2-year Treasury bond.

25. Cost of money

Answer: c Diff: E N

The correct answer is statement c. If companies' production opportunities decline leading to a decline in the demand for funds, companies will be borrowing less. If companies borrow less, the banks will need to lower rates in order to entice them to keep borrowing more. Whenever demand falls, prices (that is, the cost of funds) will fall too. Therefore, this will lead to a decrease in the cost of funds, not an increase, and statement a is incorrect. If households save a larger portion of their income, deposits at banks will increase. That is, the supply of funds increases. If deposits go up, banks will reduce their interest rates until they can entice companies to borrow more of these new funds. Therefore, this will cause a decrease in the cost of funds, not an increase, so statement b is incorrect. If households increase the money they borrow from banks, banks will have decreased deposits. That is, the supply of funds decreases. If the supply decreases, the price (that is, the cost of funds) will increase. Therefore, statement c is correct.

26. Expectations theory

Answer: c Diff: E

This is assumed by the expectations theory.

27. Expectations theory

Answer: a Diff: E

The return on the Treasury would be $k^* + IP = 3\% + 2\% = 5\%$. If inflation is expected to be 2 percent forever, then the yield curve will be flat. Statement a is true. If inflation will be constant forever, the yield curve will not slope up or down--it will be flat forever. Therefore, statement b is false. Yes, corporate bonds will yield more than 5 percent because of default risk. However, the yield curve will not be flat for corporate bonds because default risk increases with time to maturity. A company may have a low probability of default today, but can you say the same with certainty for 20 or 30 years from today? Therefore, statement c is false.

28. Expectations theory

Answer: d Diff: E

Statement d is correct; the other statements are incorrect. Statement a is incorrect; the yield curve is upward sloping. Statement b is incorrect; the 2-year rate is $(6\% + 7\%)/2 = 6.5\%$. Statement c is incorrect; see b above. Statement d is correct; the 3-year rate is $(6\% + 7\% + 8\%)/3 = 7\%$. Statement e is incorrect; see d above.

29. Expectations theory

Answer: e Diff: E

Statement a is false; the 10-year Treasury bond should have a higher yield than the 5-year Treasury bond because the yield curve is upward sloping. Statement b is false; the 10-year corporate bond should have a higher yield than the 5-year corporate bond because the yield curve is upward sloping. Statement c is false; it ignores the default risk of corporate bonds. Statement d is false; again, it ignores the default risk and liquidity premia on the corporate bond. Statement e is correct; both bonds have the same risk, so the shape of the yield curve means that the longer-maturity bond must have the higher yield.

30. Financial transactions

Answer: d Diff: M

31. Financial transactions

Answer: d Diff: M

Statements a, b, and c are incorrect. Spot and futures markets are distinguished by whether assets are sold for "on-the-spot" delivery or future delivery. Long-term debt issues are capital market transactions. New stock offerings are primary market transactions regardless of whether or not the company has issued stock in the past.

32. Interest rates

Answer: b Diff: M

33. Interest rates

Answer: b Diff: M

Statement b is correct; the others are false. If the yield curve were downward sloping, then the yield on a 3-year Treasury would be greater than the yield on a 10-year Treasury. Most evidence suggests that there is a positive maturity risk premium.

34. Interest rates

Answer: a Diff: M

The corporate bond also has a default risk premium, giving it a higher yield.

35. Term structure theories

Answer: b Diff: M

36. **Expectations theory** **Answer: e Diff: M**

Statement e is correct; the other statements are false. The expectations theory would say that an upward sloping yield curve implies that future interest rates are expected to be higher than current rates. Given the information in statement b, the expectations theory would predict that 1-year interest rates one year from now would be 9%. Then the 2-year rate would be $0.5(7\%) + 0.5(9\%) = 8\%$. Five-year corporate bond yields might be lower than 3-year treasury bills if the yield curve were downward sloping.

37. **Expectations theory** **Answer: a Diff: M**

Statement a is correct; the other statements are false. Knowing 2-year rates and 3-year rates permits no inference regarding 5-year rates. However, knowing 2-year rates and 3-year rates beginning in two years would permit applying the expectations theory to infer 5-year rates. Given the data concerning one- and 2-year rates in statement c, the market expects 1-year rates in one year to be 8%.

38. **Expectations theory** **Answer: c Diff: M**

39. **Expectations theory** **Answer: e Diff: M**

Statement a is incorrect. The yield curves could be such that the yield on a 2-year corporate bond exceeds the yield on a 5-year Treasury bond, e.g., when the yield curve for corporate bonds is very steeply upward sloping and the yield curve for Treasury bonds is relatively gradually upward sloping.

40. **Expectations theory** **Answer: c Diff: M**

$$6\% = (5\% + 7\%)/2.$$

41. **Expectations theory** **Answer: d Diff: M**

42. **Yield curve** **Answer: e Diff: M**

43. **Yield curve** **Answer: e Diff: M**

44. **Yield curve** **Answer: a Diff: M**

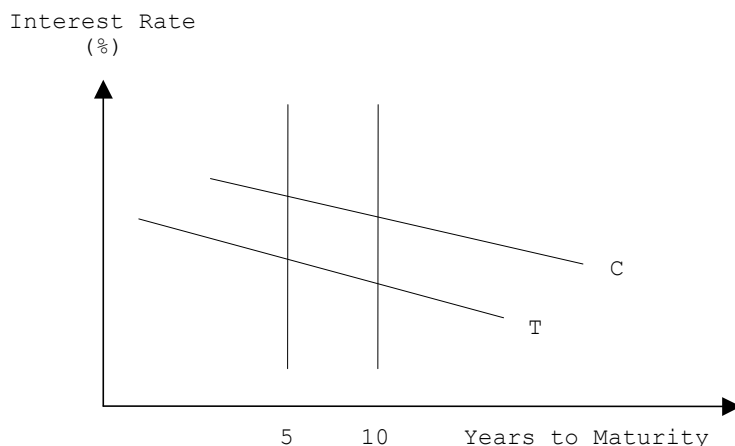
45. **Yield curve** **Answer: e Diff: M**

Statement e is correct; the others are false. Statement a is false; just because $MRP = 0$, it doesn't mean the yield curve must be flat. The yield curve could be upward or downward sloping. Statement b is false; the yield curve could be downward sloping, in which case the 5-year T-bond would have a higher yield than the 10-year corporate bond. Statement c is false; the yield curve could be downward sloping. Statement d is false; the DRP could be upward sloping.

46. Yield curve

Answer: c Diff: M

The easiest way to see this is to draw a picture. The yield curve is downward sloping, and a corporate bond always has a higher yield than a Treasury because the corporate yield includes default risk and liquidity premiums. For this question, however, the liquidity premium is zero.



Statement a is false. You really can't tell what the relationship between the 10-year corporate and a 5-year Treasury would be. In this diagram, the rate on the 10-year corporate looks like it has a higher yield, but if DRP were slightly smaller, the lines would be closer together, and the 10-year corporate could have a lower yield than the 5-year Treasury. Statement b is false. The 10-year Treasury will always have a lower yield than a 10-year corporate because the corporate yield includes the default risk premium. Statement c is correct. Because the yield curve is downward sloping, and because the Treasury curve is lower than the corporate curve, the 5-year corporate will have a higher yield than any 10-year bond of similar or less risk (that is, a Treasury).

47. Yield curve

Answer: d Diff: M N

The correct answer is statement d. From the information given in the question, we know that the yield curve is upward sloping. Statement a is correct. Statement b is also correct; the corporate bond has a longer maturity and it carries additional risk premiums (default risk and liquidity premiums) over the government bond. Statement c is incorrect; a 7-year government bond could have a greater yield than the 5-year corporate bond, but not necessarily. This depends upon the magnitude of the default risk and liquidity premiums associated with the corporate bond. Therefore, statement d is the correct choice.

48. Yield curve **Answer: d Diff: M N**

The correct answer is statement d. Recall that $k = k^* + IP + MRP + LP + DRP$, but $DRP = LP = 0$. Statement a is correct since $IP_{10} + MRP_{10} > IP_7 + MRP_7$. Statement b is correct; DRP and $LP > 0$ for corporate bonds, but equal to zero for Treasuries. Statement c may or may not be correct; it depends on how fast the IP is rising.

49. Corporate yield curve **Answer: d Diff: M**

Because the yield curve is upward sloping, all else equal, Churchill's bonds will have a lower yield than George's bonds. As Churchill's bonds are also less risky, this will hold. Note that statement b is false because it doesn't consider risk. If Churchill's bonds are riskier than George's, Churchill's bonds will have a higher yield than George's.

50. Expected interest rates **Answer: d Diff: E N**

$$\text{Average inflation} = \frac{4\% + 5\% + 6\%}{3} = 5\%.$$

$$k_{RF} = k^* + IP = 3\% + 5\% = 8\%.$$

51. Expected interest rates **Answer: a Diff: E**

If the 1-year rate in one year is X ; $(6\% + X)/2 = 5.5\%$; $X = 5\%$.

52. Expected interest rates **Answer: a Diff: E**

$$k_2 = (k_1 \text{ in Year 1} + k_1 \text{ in Year 2})/2$$

$$10.5\% = (12\% + k_1 \text{ in Year 2})/2$$

$$k_1 \text{ in Year 2} = 9\%.$$

53. Expected interest rates **Answer: b Diff: E**

$$\begin{aligned} \text{1-year T-bill} &= 6\%. \\ \text{2-year T-note} &= 6.7\%. \\ 6.7\% &= \frac{6\% + X}{2} \\ X &= 6.7\%(2) - 6\% \\ &= 7.4\%. \end{aligned}$$

54. Expected interest rates **Answer: b Diff: E**

Using the expectations theory, the rate on 2-year securities is the arithmetic average of 1-year securities now and 1-year securities in one year. $0.067 = (0.063 + X)/2$. $X = 0.071 = 7.1\%$.

55. Expected interest rates **Answer: c Diff: E**

$$\begin{aligned} \text{If } {}_2k_1 \text{ is the yield on a 1-year treasury in two years, we can say:} \\ 3 \times 6\% &= (2 \times 5.5\% + {}_2k_1) \\ 18\% &= 11\% + {}_2k_1 \\ {}_2k_1 &= 7\%. \end{aligned}$$

56. Expected interest rates **Answer: c Diff: E N**

IP is going to be the average inflation rate over the 10-year period. There will be 3 years of 2 percent inflation, then 7 years of 5 percent inflation.

$$\begin{aligned}k &= k^* + IP + MRP \\&= 4\% + (2\% \times 3 + 5\% \times 7)/10 + 0.1(10 - 1)\% \\&= 4\% + (6\% + 35\%)/10 + 0.1(9\%) \\&= 4\% + 4.1\% + 0.9\% \\&= 9.0\%.\end{aligned}$$

57. Expected interest rates **Answer: d Diff: E N**

The pure expectations hypothesis allows us to say that a long-term security yield is comprised of a weighted average of securities with shorter maturities.

$$\begin{aligned}6.5\% &= (5.5\% + 4X)/5 \\32.5\% &= 5.5\% + 4X \\27.0\% &= 4X \\6.75\% &= X.\end{aligned}$$

58. Inflation rate **Answer: c Diff: E**

$$\begin{aligned}k_{\text{Nom}} &= k^* + IP + \text{DRP} + \text{LP} + \text{MRP} \\8.5\% &= 3\% + IP + 0 + 0 + 0 \\IP &= 5.5\%.\end{aligned}$$

59. Inflation rate **Answer: d Diff: E**

$$IP_5 = (5\% + 6\% + 9\% + 13\% + 12\%)/5 = 9\%.$$

60. Default risk premium **Answer: b Diff: E N**

$$\begin{aligned}k_{C7} &= k^* + IP_7 + \text{MRP}_7 + \text{DRP}_7 + \text{LP}_7 \\7.6\% &= 3.0\% + (2\% \times 3 + 3.5\% \times 4)/7 + 0.0\% + \text{DRP}_7 + 0.4\% \\7.6\% &= 3.0\% + 2.8571\% + 0.0\% + \text{DRP}_7 + 0.4\% \\7.6\% &= 6.2571\% + \text{DRP}_7 \\ \text{DRP}_7 &= 1.3429\%.\end{aligned}$$

61. Expected interest rates **Answer: c Diff: M**

Nominal risk-free rate:
 $k_{\text{RF}} = k^* + IP = 4\% + 7\% = 11\%.$

T-bond rate:
 $k_{\text{RF}} = k^* + IP + \text{DRP} + \text{LP} + \text{MRP} = 4\% + 7\% + 0\% + 2\% + 1\% = 14\%.$

Note that there is no default risk premium on a Treasury security.

62. Expected interest rates **Answer: b Diff: M**

The MRP for the 4-year bond is $0.1\%(4 - 1) = 0.3\%$. Find the 4-year IP as $7.4\% = 2.7\% + 0.3\% + 0.9\% + IP_4$, or $IP_4 = 3.5\%$. Calculate the 7-year IP as $[3.5\%(4) + 5\%(3)]/7 = 4.14\%$. The MRP for the 7-year bond is $0.1\%(7 - 1) = 0.6\%$. Finally, the yield on the 7-year bond is $2.7\% + 0.6\% + 0.9\% + 4.14\% = 8.34\%$.

63. Expected interest rates **Answer: b Diff: M**

The return on the 5-year corporate bond is calculated as follows:

$$\begin{aligned}k_5 &= k^* + IP + MRP + DRP + LP \\8.4\% &= 3\% + [(2\% \times 3) + (4\% \times 2)]/5 + 0.4\% + DRP + LP \\DRP + LP &= 2.2\%.\end{aligned}$$

Now, calculate the 7-year corporate bond yield:

$$\begin{aligned}k_7 &= 3\% + [(2\% \times 3) + (4\% \times 4)]/7 + 0.6\% + 2.2\% \\&= 3\% + 3.1429\% + 0.6\% + 2.2\% \\&= 8.9429\% \approx 8.94\%.\end{aligned}$$

64. Expected interest rates **Answer: b Diff: M**

Step 1: Calculate LP + DRP for the 5-year bond:

$$\begin{aligned}8\% &= 3\% + IP_5 + 0.4\% + LP + DRP \\8\% &= 3\% + (3\% \times 3 + 5\% + 4\%)/5 + 0.4\% + LP + DRP \\8\% &= 3\% + 3.6\% + 0.4\% + LP + DRP \\LP + DRP &= 1\%.\end{aligned}$$

Step 2: Now, calculate the return for the 10-year bond:

$$\begin{aligned}k_{10} &= 3\% + IP_{10} + 0.9\% + 1\% \\k_{10} &= 3\% + (3\% \times 8 + 5\% + 4\%)/10 + 0.9\% + 1\% \\k_{10} &= 8.2\%.\end{aligned}$$

65. Expected interest rates **Answer: d Diff: M**

Step 1: Using the 10-yr bond yield, determine the default risk and liquidity premiums:

$$\begin{aligned}k_{10} &= k_{RF} + IP_{10} + MRP_{10} + DRP + LP \\7.8\% &= 2\% + [(2\% \times 5) + (3\% \times 5)]/10 + (0.05\%)(10 - 1) + DRP + LP \\7.8\% &= 2\% + 2.5\% + 0.45\% + DRP + LP \\2.85\% &= DRP + LP.\end{aligned}$$

Step 2: Solve for the 12-yr bond yield substituting $DRP + LP = 2.85\%$, as solved in Step 1:

$$\begin{aligned}k_{12} &= 2\% + [(2\% \times 5) + (3\% \times 7)]/12 + (0.05\%)(12 - 1) + DRP + LP \\k_{12} &= 2\% + 2.5833\% + 0.55\% + 2.85\% \\k_{12} &= 7.9833\% \approx 7.98\%.\end{aligned}$$

66. Expected interest rates

Answer: b Diff: M

$k^* = 2\%$; $MRP = 0.1\%(t - 1)$; $DRP = 0.05\%(t - 1)$; $LP = 1\%$ corporate only.

$I_1 = 3\%$; $I_2 = 4\%$; $I_3 = 5\%$; I_4 and after = 6% . $C_{10} - T_{10} = ?$

$$IP_{10} = \frac{3\% + 4\% + 5\% + 6\%(7)}{10} = \frac{54\%}{10} = 5.4\%.$$

$$k = k^* + IP + LP + DRP + MRP.$$

$$C_{10} = 2\% + 5.4\% + 1\% + 0.05\%(9) + 0.1\%(9) = 9.75\%.$$

$$T_{10} = 2\% + 5.4\% + 0\% + 0\% + 0.9\% = 8.30\%.$$

$$C_{10} - T_{10} = 9.75\% - 8.30\% = 1.45\%.$$

67. Expected interest rates

Answer: a Diff: M

Say the 1-year rate in three years is X .

From expectations theory: $6.5\% = (6\%(3) + X(1))/4$

$$6.5\%(4) = 6\%(3) + X$$

$$26\% = 18\% + X$$

$$X = 8\%.$$

68. Expected interest rates

Answer: d Diff: M

$$k_1 = 6.9\%; k_2 = 7.2\%.$$

$$7.2\% = (6.9\% + X)/2$$

$$14.4\% = 6.9\% + X$$

$$X = 7.5\%.$$

69. Expected interest rates

Answer: d Diff: M

First, find the total yield for 15 years:

$$7.2\% \times 15 \text{ yrs.} = 108\%.$$

Calculate the total yield for the first six years:

$$6.5\% \times 6 \text{ yrs.} = 39\%.$$

Now, we can find the total yield that must be earned for the next nine years:

$$108\% - 39\% = 69\%.$$

Finally, find the yield per year:

$$69\%/9 \text{ yrs.} = 7.67\%.$$

70. Expected interest rates**Answer: d Diff: M**

You want to buy a security one year from today, and you want to hold it for 3 years. You will hold this investment to the end of the fourth year. If an investor wants to invest for 4 years, he has two choices: (1) Buy a 4-year bond that yields 6.9% per year; or (2) buy a 1-year bond that yields 6.2%, then buy a 3-year bond in 1 year. The question is asking for the yield on this bond. The expectations theory makes it impossible for the investor to "profit" by choosing (1) over (2), or vice versa. Since the expectations about future inflation are already in all the interest rates, an investor will expect to get the same overall return with either strategy. If the investor picks choice #1, he will get a 4-year return of 6.9% per year. If he picks choice #2, he will get a 1-year return of 6.2% and 3 years of an unknown yield, ${}_1k_3$. Since the investor shouldn't do better with one strategy over the other, the two strategies must equal each other.

$$4 \times 6.9\% = (1 \times 6.2\%) + (3 \times {}_1k_3)$$

$$21.4\% = 3 \times {}_1k_3$$

$$7.13\% = {}_1k_3.$$

Therefore, the yield on a 3-year Treasury one year from now will be 7.13%.

71. Expected interest rates**Answer: d Diff: M**

The return on the 5-year bond is 5.2 percent, so an investor who buys this bond gets a return of 5.2 percent each year he holds the bond. The return on the 4-year bond is 4.8 percent, so an investor who buys this bond gets a return of 4.8 percent each year he holds the bond. After he holds the bond for four years, he can buy a bond for one year. He must get the same average return by holding this combination of a 4-year bond and a 1-year bond as he would have received by holding a 5-year bond. Otherwise, he would choose the combination of bonds that gives him the highest return. The expected yield 4 years from now on a 1-year bond is ${}_4k_1$.

$$4.8\% \times 4 + {}_4k_1 = 5.2\% \times 5$$

$$19.2\% + {}_4k_1 = 26\%$$

$${}_4k_1 = 6.8\%.$$

72. Expected interest rates**Answer: b Diff: M**

If you wanted to invest your money in Treasuries for 10 years, you have several choices. You can buy a 10-year Treasury, or you can buy a 7-year Treasury today, followed by a 3-year Treasury, or you can buy a 3-year Treasury today, followed by a 7-year Treasury. The expectations theory concludes that you should receive the same total return for the 10 years, no matter which alternative you choose.

This question gives us information about the 10-year security yield, and some information about buying a 7-year security followed by a 3-year security. The return on a 3-year Treasury seven years from today is written as ${}_7k_3$.

Since the returns must be equal, we can write the following equation:

$$\begin{aligned}10 \times 6.2\% &= (7 \times 5.8\%) + (3 \times {}_7k_3) \\62\% &= 40.6\% + (3 \times {}_7k_3) \\21.4\% &= 3 \times {}_7k_3 \\7.13\% &= {}_7k_3.\end{aligned}$$

73. Expected interest rates**Answer: d Diff: M**

Remember, if you purchase a 3-year Treasury today, and then a 5-year Treasury after that (for a total investment of 8 years), you will have to earn the same total yield as you would on an 8-year Treasury purchased today. So, let ${}_3k_5$ be the interest rate on the 5-year Treasury three years from now:

$$\begin{aligned}8 \times 7\% &= (3 \times 5\%) + (5 \times {}_3k_5) \\56\% &= 15\% + (5 \times {}_3k_5) \\41\% &= (5 \times {}_3k_5) \\8.2\% &= {}_3k_5.\end{aligned}$$

Therefore, the yield on a 5-year Treasury three years from today, ${}_3k_5$, is 8.2%.

74. Expected interest rates**Answer: c Diff: M**

You have a choice of purchasing one 8-year Treasury, or one 5-year Treasury followed by one 3-year Treasury. We have the data for the 5-year and 8-year securities, so we can solve for the yield on the 3-year security five years from now. The return on the 3-year security five years from today is ${}_5k_3$.

$$\begin{aligned}8 \times 5.7\% &= (5 \times 5.9\%) + (3 \times {}_5k_3) \\45.60\% &= 29.50\% + (3 \times {}_5k_3) \\16.10\% &= (3 \times {}_5k_3) \\5.37\% &= {}_5k_3.\end{aligned}$$

75. Expected interest rates**Answer: e Diff: M**

The return on the 7-year bond is 6.6 percent, so an investor who buys this bond receives a return of 6.6 percent each year he holds the bond. The return on the 5-year bond is 6.2 percent, so an investor who buys this bond receives a return of 6.2 percent each year he holds the bond. After he holds the bond for 5 years, he can buy a 2-year bond; however, according to the expectations theory, he must receive the same average return by holding this combination of a 5-year bond and a 2-year bond as he would have received by holding a 7-year bond. Otherwise, he would choose the combination of bonds that gives him the highest return. The return on the 2-year bond five years from now is written as ${}_5k_2$.

$$\begin{aligned}\frac{7 \times (6.6\%)}{7} &= \frac{5 \times 6.2\% + 2 \times {}_5k_2}{7} \\ \frac{46.2\%}{7} &= \frac{31\% + (2 \times {}_5k_2)}{7} \\ 6.6\% &= \frac{31\% + (2 \times {}_5k_2)}{7} \\ 46.2\% &= 31\% + (2 \times {}_5k_2) \\ 15.2\% &= 2 \times {}_5k_2 \\ 7.6\% &= {}_5k_2.\end{aligned}$$

76. Expected interest rates**Answer: b Diff: M**

The expected yield is ${}_3k_2$. According to the expectations theory,
 $(3 \times 5.6\%) + (2 \times {}_3k_2) = (5 \times 6.0\%)$
 $16.8\% + 2({}_3k_2) = 30\%$
 ${}_3k_2 = 6.6\%.$

77. Expected interest rates**Answer: d Diff: M**

First, find the amount of default and liquidity premia built into the 5-year bond:

Liquidity + default premia = $k_5 - k^* - IP_5 - MRP_5$.

$IP_5 = (3\% + 4\% + 5\% + 5\% + 5\%)/5 = 4.4\%.$

$MRP = 0.1\%(5 - 1) = 0.4\%.$

Liquidity + default premia = $8.5\% - 2.5\% - 4.4\% - 0.4\% = 1.2\%.$

Now, find the inflation premium and MRP for a 4-year bond one year into the future:

Inflation Premium = $(4\% + 5\% + 5\% + 5\%)/4 = 4.75\%.$

$MRP = 0.1\%(4 - 1) = 0.3\%.$

Finally, calculate the yield on the 4-year bond one year from now:

${}_1k_4 = k^* + IP_4 + MRP_4 + (\text{Default} + \text{Liquidity premia})$

${}_1k_4 = 2.5\% + 4.75\% + 0.3\% + 1.2\% = 8.75\%.$

78. Expected interest rates**Answer: b Diff: M**

$k = k^* + IP + MRP; \text{DRP} = \text{LP} = 0.$

$IP = [(3\%)5 + (5\%)7]/12 = 4.1667\%.$

$MRP = 0.1\%(12 - 1) = 1.1\%.$

$k_{12} = 3\% + 4.17\% + 1.1\%$
 $= 8.27\%.$

79. Expected interest rates**Answer: c Diff: M**

$$k = k^* + IP + MRP + DRP + LP$$

For the 10-year corporate bond:

$$8.6\% = 2\% + [(3\%)(5) + (5\%)(5)]/10 + (0.1\%)(10 - 1) + DRP + LP$$
$$DRP + LP = 1.7\%.$$

For the 8-year corporate bond:

$$k = 2\% + [(3\%)(5) + (5\%)(3)]/8 + 0.1\%(8 - 1) + 1.7\% = 8.15\%.$$

80. Expected interest rates**Answer: b Diff: M**

Using the expectations theory:

$6\% = [(10 \times 6.5\%) + (5 \times {}_{10}k_5)]/15$. Solving for ${}_{10}k_5$, the rate on a 5-year bond in 10 years, we get: ${}_{10}k_5 = 5\%$.

81. Expected interest rates**Answer: b Diff: M**

$$k = k^* + IP + MRP + DRP + LP$$

Consider the 10-year corporate bond:

$$k_{C10} = 3\% + \frac{(2\% \times 5 \text{ yrs}) + (3\% \times 5 \text{ yrs})}{10} + 0.1\%(10 - 1) + DRP + LP$$

$$7.8\% = 3\% + \frac{10\% + 15\%}{10} + 0.9\% + DRP + LP$$

$$1.4\% = DRP + LP.$$

Now consider the 15-year corporate bond:

$$k_{C15} = 3\% + \frac{(2\% \times 5 \text{ yrs}) + (3\% \times 10 \text{ yrs})}{15} + 0.1\%(15 - 1) + 1.4\%$$

$$k_{C15} = 3\% + \frac{10\% + 30\%}{15} + 1.4\% + 1.4\%$$

$$k_{C15} = 3\% + 2.6667\% + 1.4\% + 1.4\%$$

$$k_{C15} = 8.467\% \approx 8.47\%.$$

82. Expected interest rates

Answer: b Diff: M

<u>Security Maturity</u>	<u>Current Rate</u>	<u>k_1, Year 1</u>	<u>k_2, Year 2</u>	<u>k_3, Year 3</u>
1 year	8%	<input type="text" value="8%"/>		
2 year	10%	<input type="text" value="8%"/>	<input type="text" value="12%"/>	
3 year	12%	<input type="text" value="8%"/>	<input type="text" value="12%"/>	<input style="width: 50px;" type="text" value="?"/>

Calculate k_2 , the 1-year rate in Year 2:

$$10\% = (8\% + k_2) / 2$$

$$k_2 = 12\%.$$

Calculate k_3 , the 1-year rate in Year 3:

$$12\% = (8\% + 12\% + k_3) / 3$$

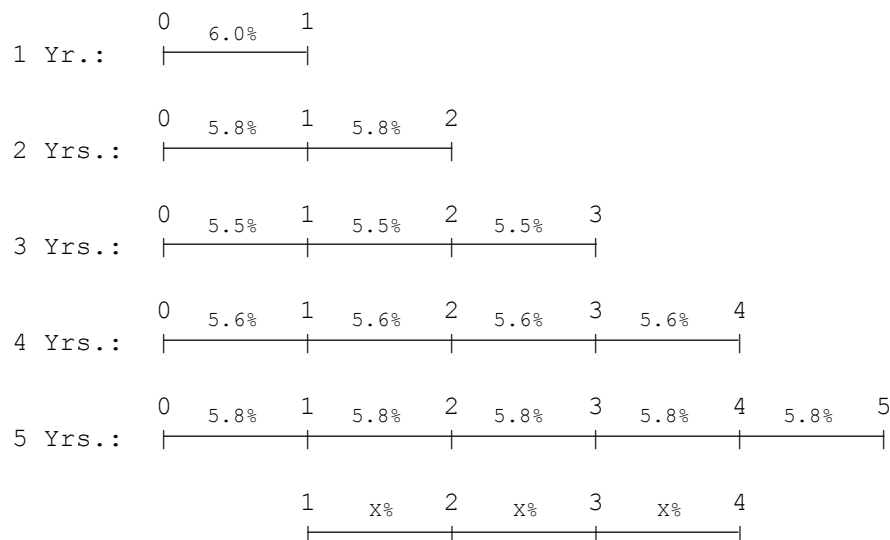
$$36\% = 20\% + k_3$$

$$k_3 = 16\%.$$

83. Expected interest rates

Answer: a Diff: M N

You need to find the three-year interest rate one year from today:



If an investor wants to invest for four years, he has two choices:

- Buy a four-year bond that yields 5.6% per year.
- Buy a one-year bond that yields 6.0% per year, then buy a three-year bond. The question is asking for the yield on this three-year bond.

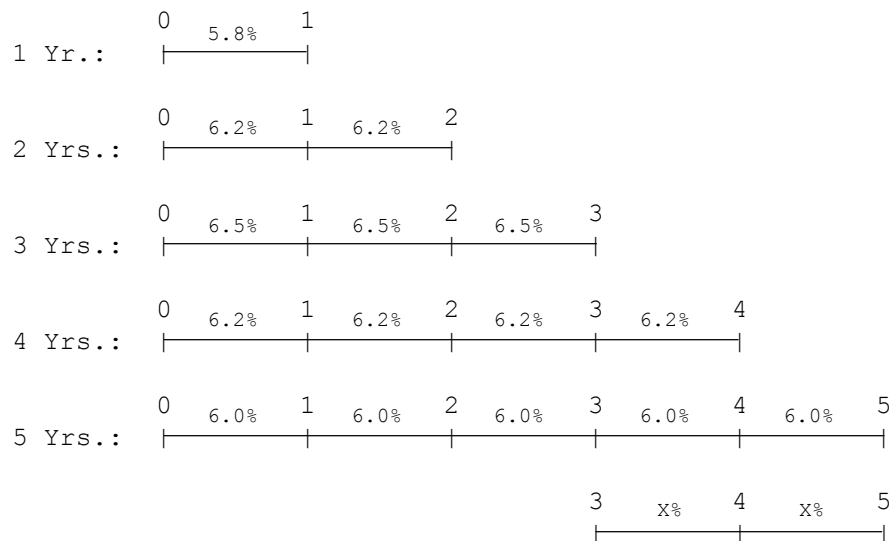
The expectations theory makes it impossible for the investor to "profit" by choosing a over b, or vice versa. Since all of the expectations about future inflation are already in all the interest rates, an investor will expect to receive the same overall return with either strategy.

If he picks a, he will receive four years of 5.6% returns. If he picks b, he will receive one year at 6.0%, and three years with an unknown yield (call it X). Since he shouldn't do better with one choice over the other, the two strategies must equal each other:

$$\begin{aligned}
 4 \times 5.6\% &= 6\% + 3X \\
 22.4\% &= 6\% + 3X \\
 16.4\% &= 3X \\
 5.47\% &= X.
 \end{aligned}$$

84. Expected interest rates

Answer: a Diff: M N



If you wanted to have Treasuries for a total of five years, you would have two choices. You could buy a five-year Treasury, or you could buy a three-year Treasury, and at its maturity, buy a two-year Treasury. Your overall expected return must be the same with both strategies. The question is asking for the yield on this 2-year Treasury, three years from now.

$$\begin{aligned}
 5(6.0\%) &= 3(6.5\%) + 2X \\
 30\% &= 19.5\% + 2X \\
 10.5\% &= 2X \\
 5.25\% &= X.
 \end{aligned}$$

85. Expected interest rates

Answer: b Diff: M N

$$k_1 = 5.2\%; k_4 = 6.3\%.$$

${}_1k_3$ denotes the three-year rate, one year from now.

$$\begin{aligned}
 4 \times k_4 &= (1 \times k_1) + (3 \times {}_1k_3) \\
 4 \times 6.3\% &= 5.2\% + (3 \times {}_1k_3) \\
 20\% &= 3 \times {}_1k_3 \\
 6.67\% &= {}_1k_3.
 \end{aligned}$$

86. Expected interest rates**Answer: c Diff: M N**

We are given the yield on a 7-year corporate bond, and we must find the yield for a 10-year corporate bond. The fact that they have the same default risk and liquidity premium is the key to solving this problem.

$$\begin{aligned}
 k_{C7} &= k^* + IP_7 + MRP_7 + (DRP + LP) \\
 9.8\% &= 3\% + \frac{4\%(4) + 3\%(3)}{7} + 0.1\%(7 - 1) + (DRP + LP) \\
 9.8\% &= 3\% + 3.57\% + 0.6\% + (DRP + LP) \\
 2.63\% &= DRP + LP.
 \end{aligned}$$

Now that we have solved for the default risk and liquidity premiums, we can carry the value forward and solve for the yield on a 10-year corporate bond.

$$\begin{aligned}
 k_{C10} &= k^* + IP_{10} + MRP_{10} + (DRP + LP) \\
 k_{C10} &= 3\% + \frac{4\%(4) + 3\%(6)}{10} + 0.1\%(10 - 1) + 2.63\% \\
 k_{C10} &= 3\% + 3.4\% + 0.9\% + 2.63\% \\
 k_{C10} &= 9.93\%.
 \end{aligned}$$

87. Real risk-free rate of interest**Answer: d Diff: M**

$$\begin{aligned}
 \text{T-bill rate} &= k^* + IP \\
 8\% &= k^* + 5\% \\
 k^* &= 3\%.
 \end{aligned}$$

88. Inflation rate**Answer: c Diff: M**

$$\begin{aligned}
 k_{T10} &= k^* + IP + MRP \\
 7\% &= 3.1\% + [2.5\%(5) + 5X]/10 + 0.1\%(10 - 1) \\
 7\% &= 3.1\% + (12.5\% + 5X)/10 + 0.9\% \\
 3\% &= (12.5\% + 5X)/10 \\
 30\% &= 12.5\% + 5X \\
 17.5\% &= 5X \\
 X &= 3.5\%.
 \end{aligned}$$

89. Inflation rate**Answer: b Diff: M**

$$\begin{aligned}
 k_{RF} &= k^* + IP \\
 13\% &= 3\% + IP \\
 IP &= 10\%.
 \end{aligned}$$

Therefore, the average inflation expected over the next 3 years is 10 percent. Using an arithmetic average:

$$\begin{aligned}
 10\% &= \frac{11\% + 11\% + IP_3}{3} \\
 30\% &= 22\% + IP_3 \\
 IP_3 &= 8\%.
 \end{aligned}$$

90. Inflation rate**Answer: d Diff: M**

First, find the expected rate of interest on 4-year Treasury bonds issued in one year as follows: $5.4\% = (1/5)(5\%) + (4/5)(X\%)$ or $X = 5.5\%$. Now, solve for the inflation premium over the 4-year period by subtracting the real risk-free rate from the expected future rate or $5.5\% - 3\% = 2.5\%$.

91. Inflation rate**Answer: b Diff: M**

$$\begin{aligned}k_2 &= 6.5\% = 3\% + 0.1\% + (3.25\% + I_2)/2 \\3.4\% &= (3.25\% + I_2)/2 \\6.8\% &= 3.25\% + I_2 \\I_2 &= 3.55\%.\end{aligned}$$

$$\begin{aligned}k_3 &= 7\% = 3\% + 0.2\% + (3.25\% + 3.55\% + I_3)/3 \\3.8\% &= (3.25\% + 3.55\% + I_3)/3 \\11.4\% &= 3.25\% + 3.55\% + I_3 \\I_3 &= 4.6\%.\end{aligned}$$

92. Inflation rate**Answer: b Diff: M**

First, find the yield on 2-year T-bonds:

$$\begin{aligned}k_2 &= k^* + IP + MRP \\&= 3\% + (3\% + 4\%)/2 + 0.1\% \\&= 0.066 = 6.6\%.\end{aligned}$$

Note that the inflation premium is an average of the first two years.

Now, we know that the 3-year T-bond yields 0.5% more than the 2-year T-bond:

$$k_3 = 6.6\% + 0.5\% = 7.1\%.$$

Next, find the inflation premium by working backwards:

$$\begin{aligned}IP_3 &= k_3 - k^* - MRP_3 \\&= 7.1\% - 3\% - 0.2\% = 0.039 = 3.9\%.\end{aligned}$$

Find expected inflation in Year 3 (I_3 represents the third year expected inflation):

$$\begin{aligned}3.9\% &= (3\% + 4\% + I_3)/3 \\11.7\% &= 7\% + I_3 \\4.7\% &= I_3.\end{aligned}$$

93. Inflation rate**Answer: a Diff: M**

Step 1: $k = k^* + IP + DRP + LP + MRP$.

Using k_5 , find $DRP + LP$:

$$\begin{aligned}0.08 &= 0.03 + 0.03 + DRP + LP + 0.004 \\DRP + LP &= 0.016.\end{aligned}$$

Step 2: Now you can find X :

$$\begin{aligned}0.09 &= 0.03 + [5(0.03) + 5(X)]/10 + 0.016 + 0.009 \\X &= 0.04 = 4\%.\end{aligned}$$

94. Inflation rate**Answer: e Diff: M**

Step 1: Calculate the default risk and liquidity premiums using information for the 5-year bond:

$$k = k^* + IP + DRP + LP + MRP.$$

For the 5-year corporate bond:

$$7.5\% = 2\% + (2\% \times 5)/5 + DRP + LP + 0.1\%(5 - 1)$$

$$7.5\% = 2\% + 2\% + DRP + LP + 0.4\%$$

$$3.1\% = DRP + LP.$$

Step 2: Calculate the average inflation rate for 2008 through 2013 by substituting the information found in Step 1 using data for the 10-year corporate bond:

$$8.2\% = 2\% + (2\% \times 5 + 5X)/10 + 3.1\% + 0.1\%(10 - 1)$$

$$8.2\% = 2\% + (10\% + 5X)/10 + 3.1\% + 0.9\%$$

$$8.2\% = 6\% + (10\% + 5X)/10$$

$$2.2\% = (10\% + 5X)/10$$

$$22\% = 10\% + 5X$$

$$12 = 5X$$

$$2.4\% = X.$$

95. Default risk premium**Answer: a Diff: M**

We're given all the components to determine the yield on Gator Corp. bonds except the default risk premium (DRP) and MRP. Calculate the MRP as $0.1\%(10 - 1) = 0.9\%$. Now, we can solve for the DRP as follows: $8\% = 3\% + 2.5\% + 0.9\% + 0.5\% + DRP$, or $DRP = 1.1\%$.

96. Maturity risk premium**Answer: d Diff: M**

$$k_{10} = k_5 + 1\%.$$

$$\begin{aligned} k_{10} &= 2\% + [3\%(3) + (4\%)(7)]/10 + MRP_{10} \\ &= 2\% + 3.7\% + MRP_{10} \\ &= 5.7\% + MRP_{10}. \end{aligned}$$

$$\begin{aligned} k_5 &= 2\% + [3\%(3) + (4\%)(2)]/5 + MRP_5 \\ &= 2\% + 3.4\% + MRP_5 \\ &= 5.4\% + MRP_5. \end{aligned}$$

$$\text{Remember, } k_{10} = k_5 + 1\%.$$

$$5.7\% + MRP_{10} = 5.4\% + MRP_5 + 1\%$$

$$\begin{aligned} MRP_{10} - MRP_5 &= 5.4\% + 1\% - 5.7\% \\ &= 0.7\%. \end{aligned}$$

97. Maturity risk premium**Answer: a Diff: M**

First, calculate the inflation premiums for the next two and four years, respectively. They are $IP_2 = (3\% + 4\%)/2 = 3.5\%$ and $IP_4 = (3\% + 4\% + 5\% + 5\%)/4 = 4.25\%$. The real risk-free rate is given as 3%. Thus, $6.8\% = 3\% + 3.5\% + MRP_2$, or $MRP_2 = 0.3\%$. Similarly, $7.6\% = 3\% + 4.25\% + MRP_4$, or $MRP_4 = 0.35\%$. Thus, $MRP_4 - MRP_2 = 0.35\% - 0.30\% = 0.05\%$.

98. Maturity risk premium**Answer: d Diff: M**

The 6-year inflation premium $IP_6 = (4\% + 4\% + 4.5\% + 4.5\% + 5\% + 5\%)/6 = 4.5\%$. The 6-year Treasury bond yield is $3\% + 4.5\% + 0.9\% = 8.40\%$. The 4-year Treasury bonds yield 0.6% less, or $8.40\% - 0.60\% = 7.80\%$. The 4-year inflation premium $IP_4 = (4\% + 4\% + 4.5\% + 4.5\%)/4 = 4.25\%$. Solve for MRP_4 as $7.80\% = 3\% + 4.25\% + MRP_4$, or $MRP_4 = 7.80\% - 7.25\% = 0.55\%$.

99. Expected interest rates**Answer: c Diff: E N**

This is a simple pure expectations question that gives you the one-year rate and the two-year rate, but asks for the one-year rate, one year from now. We must apply the concept that the two-year rate is an average of one-year rates. (k_1 denotes the one-year rate; ${}_1k_1$ denotes the one-year rate, one year from now, etc.)

$$k_2 = \frac{k_1 + {}_1k_1}{2}$$

$$5.5\% = \frac{5.0\% + {}_1k_1}{2}$$

$$11.0\% = 5.0\% + {}_1k_1$$

$$6.0\% = {}_1k_1.$$

100. Expected interest rates**Answer: e Diff: E N**

We are given the five-year rate (k_5) and the one-year rate, four years from now (${}_4k_1$). Therefore, we can solve for the current four-year rate:

$$k_5 = \frac{k_4(4) + {}_4k_1(1)}{5}$$

$$7.0\% = \frac{k_4(4) + 7.2\%}{5}$$

$$35.0\% = (4)k_4 + 7.2\%$$

$$27.8\% = (4)k_4$$

$$6.95\% = k_4.$$

101. Average inflation**Answer: b Diff: M N**

We know $k_{T5} = 5\%$, and $k_{T10} = 6\%$ (both given). Since $IP_{10} = 2.5\%$, then $k_{T10} = k^* + 2.5\%$. (Since these are Treasuries $DRP = LP = 0$.)

Step 1: Solve for the real risk-free rate:

$$k_{T10} = k^* + 2.5\%$$

$$6\% = k^* + 2.5\%$$

$$3.5\% = k^*.$$

Step 2: Solve for average inflation over next 5 years:

$$k_{T5} = k^* + IP_5$$

$$5\% = 3.5\% + IP_5$$

$$IP_5 = 1.5\%.$$

102. Expected interest rates**Answer: c Diff: M N**

Use $k^* = 3.5\%$ and $IP_5 = 1.5\%$ from previous problem.

Step 1: Solve for the sum of the default and liquidity risk premiums.

$$\begin{aligned}k_{C10} &= k^* + IP_{10} + MRP + DRP + LP \\8\% &= 3.5\% + 2.5\% + 0 + DRP + LP \\2\% &= DRP + LP.\end{aligned}$$

Step 2: Solve for the yield on the 5-year corporate bond.

$$\begin{aligned}k_{C5} &= k^* + IP_5 + MRP + DRP + LP \\&= 3.5\% + 1.5\% + 0 + DRP + LP \\&= 3.5\% + 1.5\% + 0 + 2\% \\&= 7\%.\end{aligned}$$

103. Expected interest rates**Answer: c Diff: E N**

$IP_3 = (3\% + 4\% + 5\%)/3 = 4\%$. So $k_3 = k^* + IP_3 = 3\% + 4\% = 7\%$.

104. Expected inflation**Answer: e Diff: E N**

$k_{T4} = 8\%$. $IP_4 = 8\% - 3\% = 5\%$, which is the average inflation premium over the 4-year period. So, $5\% = (3\% + 4\% + 5\% + X)/4$. So, $X = 8\%$, or $I_4 = 8\%$.

105. Expected interest rates**Answer: a Diff: M N**

$$\begin{aligned}15 \times 7.2\% &= 10 \times 7.5\% + 5 \times X \\108\% &= 75\% + 5X \\33\% &= 5X \\6.6\% &= X.\end{aligned}$$

106. Expected interest rates**Answer: d Diff: M N**

$$\begin{aligned}2 \times 6.5\% + 1 \times 6.8\% &= 1 \times 6\% + 2 \times X \\19.8\% &= 6\% + 2X \\13.8\% &= 2X \\6.9\% &= X.\end{aligned}$$