Saunders Financial Institutions and Management 10e TB CH09

Risk & Financial Institutions (The University of Western Ontario)

Chapter 09 Interest Rate Risk II

KEY

1. In most countries FIs report their balance sheet using market value accounting.

FALSE

2. Market value accounting reflects economic reality of a FIs balance sheet.

TRUE

3. Marking-to-market accounting is a market value accounting method that reflects the purchase prices of assets and liabilities.

FALSE

4. The difference between the changes in the market value of assets and market value of liabilities for a given change in interest rates is, by definition, the change in the FI's net worth.

TRUE

5. Duration measures the average life of a financial asset or financial liability.

TRUE

6. The economic meaning of duration is the interest elasticity of a financial asset's price.

TRUE

7. Interest elasticity is the percentage change in the price of a bond for any given change in interest rates.

TRUE

8. Duration considers the timing of all the cash flows of an asset by summing the product of the cash flows and the time of occurrence.

FALSE

9. A key assumption of Macaulay duration is that the yield curve is flat so that all cash flows are discounted at the same discount rate.

TRUE

10. Duration is the weighted-average present value of the cash flows using the timing of the cash flows as weights.

FALSE

11. In duration analysis, the times at which cash flows are received are weighted by the relative importance in present value terms of the cash flows arriving at each point in time.

TRUE

12. Normally, duration is less than the maturity for a fixed income asset.

TRUE

13. Duration is equal to maturity when at least some of the cash flows are received upon maturity of the asset.

FALSE

14. Duration of a fixed-rate coupon bond will always be greater than one-half of the maturity.

FALSE

15. Duration is related to maturity in a linear manner through the interest rate of the asset.

FALSE

16. Duration is related to maturity in a nonlinear manner through the current yield to maturity of the asset.

TRUE

17. Duration of a zero coupon bond is equal to the bond's maturity.

TRUE

18. As interest rates rise, the duration of a consol bond decreases.

TRUE

19. Duration increases with the maturity of a fixed-income asset at a decreasing rate.

TRUE

20. For a given maturity fixed-income asset, duration decreases as the market yield increases.

TRUE

21. For a given maturity fixed-income asset, duration increases as the promised interest payment declines.

FALSE

22. Larger coupon payments on a fixed-income asset cause the present value weights of the cash flows to be lower in the duration calculation.

FALSE

23. The value for duration describes the percentage increase in the price of a fixed-income asset for a given increase in the required yield or interest rate.

FALSE

24. For a given change in required yields, short-duration securities suffer a smaller capital loss or receive a smaller capital gain than do long-duration securities.

TRUE

25. Investing in a zero-coupon asset with a maturity equal to the desired investment horizon is one method of immunizing against changes in interest rates.

TRUE

26. Investing in a zero-coupon asset with a maturity equal to the desired investment horizon removes interest rate risk from the investment management process.

TRUE

27. Buying a fixed-rate asset whose duration is exactly equal to the desired investment horizon immunizes against interest rate risk.

TRUE

28. Deep discount bonds are semi-annual fixed-rate coupon bonds that sell at a market price that is less than par value.

FALSE

29. Using a fixed-rate bond to immunize a desired investment horizon means that the reinvested coupon payments are not affected by changes in market interest rates.

FALSE

30. An FI can immunize its portfolio by matching the maturity of its asset with its liabilities.

FALSE

31. The immunization of a portfolio against interest rate risk means that the portfolio will neither gain nor lose value when interest rates change.

TRUE

32. Perfect matching of the maturities of the assets and liabilities will always achieve perfect immunization for the equity holders of an FI against interest rate risk.

FALSE

33. Matching the maturities of assets and liabilities is not a perfect method of immunizing the balance sheet because the timing of the cash flows is likely to differ between the assets and liabilities.

TRUE

34. The duration of a portfolio of assets can be found by calculating the book value weighted average of the durations of the individual assets.

FALSE

35. For given changes in interest rates, the change in the market value of net worth of an FI is equal to the difference between the changes in the market value of the assets and market value of the liabilities.

TRUE

36. Immunizing the balance sheet of an FI against interest rate risk requires that the leverage adjusted duration gap (D_A-kD_L) should be set to zero.

TRUE

37. The smaller the leverage-adjusted duration gap, the more exposed the FI is to interest rate shocks.

<u>FALSE</u>

38. The larger the interest rate shock, the smaller the interest rate risk exposure of an FI.

<u>FALSE</u>

39. Setting the duration of the assets higher than the duration of the liabilities will exactly immunize the net worth of an FI from interest rate shocks.

<u>FALSE</u>

40. Immunization of a FIs net worth requires the duration of the liabilities to be adjusted for the amount of leverage on the balance sheet.

<u>TRUE</u>

41. The leverage adjusted duration of a typical depository institution is positive.

<u>TRUE</u>

42. To measure duration gap one should first determine the duration of an FI's asset portfolio and the duration of its liability portfolio.

<u>TRUE</u>

43. One method of changing the positive leverage adjusted duration gap for the purpose of immunizing the net worth of a typical depository institution is to increase the duration of the assets and to decrease the duration of the liabilities.

<u>FALSE</u>

44. Attempts to satisfy the objectives of shareholders and regulators requires the bank to use the same duration match in the protection of net worth from interest rate risk.

<u>FALSE</u>

45. Immunizing the net worth ratio requires that the duration of the assets be set equal to the duration of the liabilities.

<u>TRUE</u>

46. The cost in terms of both time and money to restructure the balance sheet of large and complex FIs has decreased over time.

<u>TRUE</u>

47. Immunizing net worth from interest rate risk using duration matching requires that the duration match must be realigned periodically as the maturity horizon approaches.

TRUE

48. The rate of change in duration values is less than the rate of change in maturity.

TRUE

49. As the investment horizon approaches, the duration of an unrebalanced portfolio that originally was immunized will be less than the time remaining to the investment horizon.

FALSE

50. The use of duration to predict changes in bond prices for given changes in interest rate changes will always underestimate the amount of the true price change.

FALSE

51. The fact that the capital gain effect for rate decreases is greater than the capital loss effect for rate increases is caused by convexity in the yield-price relationship.

TRUE

52. Convexity is a desirable effect to a portfolio manager because it is easy to measure and price.

FALSE

53. All fixed-income assets exhibit convexity in their price-yield relationships.

TRUE

54. The greater is convexity, the more insurance a portfolio manager has against interest rate increases and the greater potential gain from rate decreases.

TRUE

55. The error from using duration to estimate the new price of a fixed-income security will be less as the amount of convexity increases.

FALSE

56. Dollar duration is the dollar value change in a security's price to a 1 percent change in the return on the security.

TRUE

57. Modified duration is defined as duration multiplied by 1 plus the interest rate.

FALSE

58. Which of the following statements is true regarding duration?
A. increases with the maturity of a fixed-income security but at a decreasing rate.
B. decreases as the yield on a security increases.
C. decreases as the coupon or interest payment increases.
D. is equal to the maturity of an immunized security.
E. all of the above are true.

59. Which of the following statements is true regarding effects of interest rate changes on the market value of an FI's equity or net worth?
A. the leverage adjusted duration gap reflects the degree of duration mismatch in an FI's balance sheet.
B. the size of the FI reflects the scale of the FI and its potential net worth exposure from any given interest rate shock.
C. the size of the interest rate shock; the larger the size the greater the FI's exposure.
D. A, B, and C are true.
E. none of the above are true.

60. The economic interpretation of duration is
A. the percentage of the current market price of a security that is accounted for by the book value of the security.
B. the interest elasticity of a security to a small change in interest rates.
C. the maturity elasticity of a security to a small change in cash flows of the security.
D. the price elasticity of a security to a small change in interest rates.
E. The average time it will take to equate the present value of future cash flows from the security to the cost of the security.

61. All else equal, as compared to an annual payment fixed income security, a semi-annual payment security has a
A. lower duration value and lower market value.
B. higher duration but lower price sensitivity.
C. lower duration and more cash flows.
D. higher duration and more cash flows.
E. none of the options.

62. A relatively high numerical value of the duration of an asset means which of the following t?
A. Low sensitivity of an asset price to interest rate shocks.
B. High interest inelasticity of a bond.
C. High sensitivity of an asset price to interest rate shocks.
D. Lack of sensitivity of an asset price to interest rate shocks.

E. Smaller capital loss for a given change in interest rates.

63. For small change in interest rates, market prices of bonds are inversely proportional to their
A. equity.
B. asset value.
C. liability value.
D. duration value.
E. none of the options.

64. The duration of all floating rate debt instruments is
A. equal to the time to maturity.
B. less than the time to repricing of the instrument.
C. time interval between the purchase of the security and its sale.
D. equal to time to repricing of the instrument.
E. infinity.

65. Managers can achieve the results of duration matching by using these to hedge interest rate risk.
A. Rate sensitive assets.
B. Rate sensitive liabilities.
C. Coupon bonds.
D. Consol bonds.
E. Derivatives.

66. Immunizing the balance sheet to protect equity holders from the effects of interest rate risk occurs when
A. the maturity gap is zero, so that all assets have a matching-maturity liability.
B. the repricing gap is zero, so that all assets have a matching liability that reprices at the same time.
C. the modified duration gap of the balance sheet is zero.
D. the effect of a change in the level of interest rates on the value of the assets of the FI is exactly offset by the effect of the same change in interest rates on the liabilities of the FI.
E. When the modified duration is equal to the dollar duration.

67. Suppose a pension fund must have $10,000,000 five years from now to make required payments to retirees. If the pension wants to guarantee the funds are available regardless of future interest rate changes, it should
A. sell a 5-year duration bond so that it matures with a book value of $10,000,000.
B. sell $10,000,000 face value discount bonds with a duration of five years.
C. purchase 7-year, semi-annual coupon bonds that have a duration of five years.
D. purchase 8-year, annual payment bonds that have a dollar duration of $10,000,000.
E. none of the options since future interest rates are too unpredictable.

68. Why does immunization against interest rate shocks using duration for fixed-income securities work?
A. Because interest rate changes are relatively predictable.

B. Because the gains or losses on reinvested cash flows that result from an interest rate change are exactly offset by losses or gains from the security when it is sold.
C. Because the fixed-income security gravitates toward its maturity value as it approaches its maximum duration.
D. Because cash flows that result from the security are not reinvested so they are not affected by interest rate changes in the same way as the security's gain or loss when it is sold.
E. It doesn't work because perfect immunization is impossible to accomplish.

69. Which of the following statements about leverage-adjusted duration gap is true?
A. It is equal to the duration of the assets minus the duration of the liabilities.
B. Larger the gap in absolute terms, the more exposed the FI is to interest rate shocks.
C. It reflects the degree of maturity mismatch in an FI's balance sheet.
D. It indicates the dollar size of the potential net worth.
E. Its value is equal to duration divided by (1 + R).

70. The larger the size of an FI, the larger the __________ from any given interest rate shock.
A. duration mismatch
B. immunization effect
C. net worth exposure
D. net interest income
E. risk of bankruptcy

71. The duration of a consol bond is
A. less than its maturity.
B. infinity.
C. 30 years.
D. more than its maturity.
E. given by the formula $D = 1/(1\text{-}R)$.

72. Calculating modified duration involves
A. dividing the value of duration by the change in the market interest rate.
B. dividing the value of duration by 1 plus the interest rate.
C. dividing the value of duration by discounted change in interest rates.
D. multiplying the value of duration by discounted change in interest rates.
E. dividing the value of duration by the curvature effect.

73. Dollar duration of a fixed-income security is defined as
A. the dollar value change in the price of a security to a one-percent change in the return on the security.
B. the dollar value change in the price of a security to a change in the Macaulay's duration of the security.
C. The market price of a security following a one-percent change in the return on the security.
D. Macaulay's duration divided by one plus the interest rate times the market price of the security.
E. the modified duration of a security times the price of the security.

74. Immunization of a portfolio implies that changes in _____ will not affect the value of the portfolio.
A. book value of assets
B. maturity
C. market prices
D. interest rates
E. duration

75. Which of the following statements is true?
A. The optimal duration gap is zero.
B. Duration gap measures the impact of changes in interest rates on the market value of equity.
C. The shorter the maturity of the FI's securities, the greater the FI's interest rate risk exposure.
D. The duration of all floating rate debt instruments is equal to the time to maturity.
E. The duration of equity is equal to the duration of assets minus the duration of liabilities.

76. When does "duration" become a less accurate predictor of expected change in security prices?
A. As interest rate shocks increase in size.
B. As interest rate shocks decrease in size.
C. When maturity distributions of an FI's assets and liabilities are considered.
D. As inflation decreases.
E. When the leverage adjustment is incorporated.

77. An FI has financial assets of $800 and equity of $50. If the duration of assets is 1.21 years and the duration of all liabilities is 0.25 years, what is the leverage-adjusted duration gap?
A. 0.9000 years.
B. 0.9600 years.
C. 0.9756 years.
D. 0.8844 years.
E. Cannot be determined.

Leverage-adjusted duration gap

$$-[D_A - D_L k] = -\left[1.21 - 0.25 \times \left(\frac{800-50}{800}\right)\right] = -[1.21 - 0.234375] = -0.9756$$

78. Calculate the duration of a two-year corporate bond paying 6 percent interest annually, selling at par. Principal of $20,000,000 is due at the end of two years.
A. 2 years.
B. 1.91 years.
C. 1.94 years.
D. 1.49 years.
E. 1.75 years.

Feedback:

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{1{,}200{,}000}{(1.06)^1} \times 1\right] + \left[\frac{1{,}200{,}000 + 20{,}000{,}000}{(1.06)^2} \times 2\right]}{20{,}000{,}000} = 1.9434$$

79. Calculate the duration of a two-year corporate loan paying 6 percent interest annually, selling at par. The $30,000,000 loan is 100 percent amortizing with annual payments.
A. 2 years.
B. 1.89 years.
C. 1.94 years.
D. 1.49 years.
E. 1.73 years.

Feedback: Fully amortizing loan cash flows:

PV = 30,000,000	FV = 0	I = 6	N = 2	**PMT = 16,363,107**

Macaulay's Duration

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{16{,}363{,}107}{(1.06)^1} \times 1\right] + \left[\frac{16{,}363{,}107}{(1.06)^2} \times 2\right]}{30{,}000{,}000} = 1.4854$$

80. Calculate the modified duration of a two-year corporate loan paying 6 percent interest annually. The $40,000,000 loan is 100 percent amortizing, and the current yield is 9 percent annually.
A. 2 years.
B. 1.91 years.
C. 1.94 years.
D. 1.49 years.
E. 1.36 years.

Feedback: Fully amortizing loan cash flows:

PV = 40,000,000	FV = 0	I = 6	N = 2	**PMT = 21,817,476**

Fair Market Value

PV = 38,379,366	FV = 0	I = 9	N = 2	PMT = 21,817,476

Macaulay's Duration

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{21,817,476}{(1.09)^1} \times 1\right] + \left[\frac{21,817,476}{(1.09)^2} \times 2\right]}{38,379,366} = 1.4785$$

Modified Duration

$$MD = \frac{D}{(1 + R)} = \frac{1.4785}{(1.09)} = 1.3564$$

81. An FI purchases a $9.982 million pool of commercial loans at par. The loans have an interest rate of 8 percent, a maturity of five years, and annual payments of principal and interest that will exactly amortize the loan at maturity. What is the duration of this asset?
A. 4.12 years.
B. 3.07 years.
C. 2.50 years.
D. 2.85 years.
E. 5.00 years.

Feedback: Fully amortizing loan cash flows:

PV = 9,982,000	FV = 0	I = 8	N = 5	**PMT = 2,500,056**

Macaulay's Duration

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t}$$

$$D = \frac{\left[\frac{2,500,056}{(1.08)^1} \times 1\right] + \left[\frac{2,500,056}{(1.08)^2} \times 2\right]\left[\frac{2,500,056}{(1.08)^3} \times 3\right]\left[\frac{2,500,056}{(1.08)^4} \times 4\right]\left[\frac{2,500,056}{(1.08)^5} \times 5\right]}{9,982,000} = 1.4785$$

82. A $1,000 six-year Eurobond has an 8 percent coupon, is selling at par, and contracts to make annual payments of interest. The duration of this bond is 4.99 years. What will be the new price using the duration model if interest rates increase to 8.5 percent?
A. $23.10.
B. $976.90.

C. $977.23.
D. $1,023.10.
E. -$23.10.

Feedback: Modified Duration

$$MD = \frac{D}{(1 + R)} = \frac{4.99}{(1.08)} = 4.62$$

Dollar Duration

$$Dollar\ Duration = MD \times P = 4.62 \times 1{,}000 = 4{,}620$$

Change in Price

$$\Delta P = -Dollar\ Duration \times \Delta R = 4{,}620 \times 0.005 = -23.10$$

New Price

$$1{,}000 - 23.10 = \$976.90$$

83. An FI purchases at par value a $100,000 Treasury bond paying 10 percent interest with a 7.5 year duration. If interest rates rise by 4 percent, calculate the bond's new value.
Recall that Treasury bonds pay interest semiannually. Use the duration valuation equation.
A. $28,572
B. $20,864
C. $15,000
D. $22,642
E. $71,428

Feedback: Modified Duration, semi-annual

$$MD = \frac{D}{\left(1 + \frac{1}{2}R\right)} = \frac{7.50}{(1.05)} = 7.143$$

Dollar Duration

$$Dollar\ Duration = MD \times P = 7.143 \times 100{,}000 = 714{,}300$$

Change in Price

$$\Delta P = -Dollar\ Duration \times \Delta R = 714{,}300 \times 0.04 = -28{,}572$$

New Price

$$100{,}000 - 28{,}572 = \$71{,}428$$

84. What is the duration of an 8 percent annual payment two-year note that currently sells at par?
A. 2 years.
B. 1.75 years.
C. 1.93 years.
D. 1.5 years.
E. 1.97 years.

Feedback: Macaulay's Duration

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{8}{(1.08)^1} \times 1\right] + \left[\frac{8 + 100}{(1.08)^2} \times 2\right]}{100} = 1.9259\ years$$

85. What is the duration of a 5-year par value zero coupon bond yielding 10 percent annually?
A. 0.50 years.
B. 2.00 years.
C. 4.40 years.
D. 5.00 years.
E. 4.05 years.

Feedback: Macaulay's Duration

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{100}{(1.10)^5} \times 5\right]}{\left[\frac{100}{(1.10)^5}\right]} = \frac{310.46}{62.09} = 5.00\ years$$

The duration of a zero coupon bond is equal to its maturity.

First Duration, a securities dealer, has a leverage-adjusted duration gap of 1.21 years, $60 million in assets, 7 percent equity to assets ratio, and market rates are 8 percent.
[Reference: 9-80]

86. What is the impact on the dealer's market value of equity per $100 of assets if the change in all interest rates is an increase of 0.5 percent [i.e., ΔR = 0.5 percent]
A. +$336,111.
B. -$0.605.
C. -$336,111.
D. +$0.605.
E. -$363,000.

[Refer to: 9-80]

Feedback: Change in the market value of equity, leverage-adjusted duration gap

$$\Delta E = -[D_A - D_L k] \times A \times \frac{\Delta R}{(1+R)} \text{ Where } k = \frac{L}{A}$$

ΔE = −1.21 × $60,000,000 × (0.005 ÷ 1.08) = −$336,111

87. What conclusions can you draw from the duration gap in your answer to the previous question?
A. The market value of the dealer's equity decreases slightly if interest rates fall.
B. The market value of the dealer's equity becomes negative if interest rates rise.
C. The market value of the dealer's equity decreases slightly if interest rates rise.
D. The market value of the dealer's equity becomes negative if interest rates fall.
E. The dealer has no interest rate risk exposure.

[Refer to: 9-80]

88. Consider a one-year maturity, $100,000 face value bond that pays a 6 percent fixed coupon annually. What is the price of the bond if market interest rates are 7 percent?
A. $99,050.15.
B. $99,457.94.
C. $99,249.62.
D. $100,000.00.
E. $99,065.42.

Feedback: $100,000 face value, 6% annual coupon, 1 year maturity, 7% rate

PV = 99,065.42	FV = 100,000	I = 7	N = 1	PMT = 6,000

$100,000 face value, 6% annual coupon, 1-year maturity, 5% rate

PV = 100,952.38	FV = 100,000	I = 5	N = 1	PMT = 6,000

Percent change in price in rates increase from 6.0 percent to 6.5 percent

PV = 99,530.52	FV = 100,000	I = 6.5	N = 1	PMT = 6,000

Percent $\Delta P = (P_1 - P_0) \div P_0$
$\%\Delta P = (99{,}530.52 - 100{,}000) \div 100{,}000 = -0.004695$

Consider a six-year maturity, $100,000 face value bond that pays a 5 percent fixed coupon annually.
[Reference: 9-89]

89. What is the price of the bond if market interest rates are 4 percent?
A. $105,816.44.
B. $105,287.67.
C. $105,242.14.
D. $100,000.00.
E. $106,290.56.

[Refer to: 9-89]

Feedback: $100,000 face value, 5% annual coupon, 6 year maturity, 4% rate

PV = 105,242.14	FV = 100,000	I = 4	N = 6	PMT = 5,000

90. What is the price of the bond if market interest rates are 6 percent?
A. $95,082.68.
B. $95,769.55.
C. $95,023.00.
D. $100,000.00.
E. $96,557.87.

[Refer to: 9-89]

Feedback: $100,000 face value, 5% annual coupon, 6 year maturity, 6% rate

PV = 95,082.68	FV = 100,000	I = 6	N = 6	PMT = 5,000

91. What is the percentage price change for the bond if interest rates decline 50 basis points from the original 5 percent?
A. -2.106 percent.
B. +2.579 percent.
C. +0.000 percent.
D. +3.739 percent.
E. +2.444 percent.

[Refer to: 9-83]

Feedback: Percent change in price in rates decrease from 5.0 percent to 4.5 percent

PV = 102,578.94	FV = 100,000	I = 4.5	N = 6	PMT = 5,000

Percent $\Delta P = (P_1 - P_0) \div P_0$
$\%\Delta P = (102{,}578.94 - 100{,}000) \div 100{,}000 = +0.025789$

First Duration Bank has the following assets and liabilities on its balance sheet

Assets	Par Amount	Rate	Liabilities	Par Amount	Rate
2-year commercial loans, annual fixed rate, at par	$400 million	10 %	1-year CDs, annual fixed rate, at par	$450 million	7 %
1-year Treasury bills	$100 million		Net Worth	$50 million	

[Reference: 92]

92. What is the duration of the commercial loans?
A. 1.00 years.
B. 2.00 years.
C. 1.73 years.
D. 1.91 years.
E. 1.50 years.

[Refer to: 9-92]

Feedback: Duration of commercial loans

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{40{,}000{,}000}{(1.10)^1} \times 1\right] + \left[\frac{40{,}000{,}000 + 400{,}000{,}000}{(1.10)^2} \times 2\right]}{400{,}000{,}000} = 1.9114$$

93. What is the FI's leverage-adjusted duration gap?
A. 0.91 years.
B. 0.83 years.
C. 0.73 years.
D. 0.50 years.
E. 0 years.

[Refer to: 9-92]

Feedback: Leverage-adjusted duration.

Duration of the CDs first

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{31{,}500{,}000 + 450{,}000{,}000}{(1.07)^1} \times 1\right]}{450{,}000{,}000} = 1.000$$

1-year T-bills will also have a duration of 1
Duration of the assets is a weighted average
$D_A = (400/500) \times 1.9114 + (100/500) \times 1.000 = 1.52912 + 0.200 = 1.72912$
Finally, leverage-adjusted duration

$$[D_A - D_L k] = \left[1.72912 - 1.000 \times \left(\frac{500-50}{500}\right)\right] = [1.72912 - 0.900] = 0.82912$$

94. What is the FI's interest rate risk exposure?
A. Exposed to increasing rates.
B. Exposed to decreasing rates.
C. Perfectly balanced.
D. Exposed to long-term rate changes.
E. Insufficient information.

[Refer to: 9-92]

The following information is about current spot rates for Second Duration Savings' assets (loans) and liabilities (CDs). All interest rates are fixed and paid annually.

Assets	Liabilities
1-year loan rate: 7.50 percent	1-year CD rate: 6.50 percent
2-year loan rate: 8.15 percent	2-year CD rate: 6.65 percent

[Reference: 8-95]

95. If rates do not change, the balance sheet position that maximizes the FI's returns is
A. a positive spread of 15 basis points by selling 1-year CDs to finance 2-year CDs.
B. a positive spread of 100 basis points by selling 1-year CDs to finance 1-year loans.
C. a positive spread of 85 basis points by financing the purchase of a 1-year loan with a 2-year CD.
D. a positive spread of 165 basis points by selling 1-year CDs to finance 2-year loans.
E. a positive spread of 150 basis points by selling 2-year CDs to finance 2-year loans.

[Refer to: 9-95]

96. What is the interest rate risk exposure of the optimal transaction in the previous question over the next 2 years?
A. The risk that interest rates will rise since the FI must purchase a 2-year CD in one year.
B. The risk that interest rates will rise since the FI must sell a 1-year CD in one year.
C. The risk that interest rates will fall since the FI must sell a 2-year loan in one year.
D. The risk that interest rates will fall since the FI must buy a 1-year loan in one year.
E. There is no interest rate risk exposure.

[Refer to: 9-95]

97. What is the duration of the two-year loan (per $100 face value) if it is selling at par?
A. 2.00 years
B. 1.92 years
C. 1.96 years
D. 1.00 year
E. 0.91 years

[Refer to: 9-95]

Feedback:

$$D = \frac{\sum_{t=1}^{N} PV_t \times t}{\sum_{t=1}^{N} P_t} = \frac{\left[\frac{100}{(1.0815)^1} \times 1\right] + \left[\frac{8.15 + 100}{(1.0815)^2} \times 2\right]}{100} = 1.92$$

98. If the FI finances a $500,000 2-year loan with a $400,000 1-year CD and equity, what is the leveraged adjusted duration gap of this position? Use your answer to the previous question.
A. +1.25 years
B. +1.12 years
C. -1.12 years
D. +0.92 years
E. -1.25 years

[Refer to: 9-95]

Feedback:

$$[D_A - D_L k] = \left[1.92 - 1.000 \times \left(\frac{400}{500}\right)\right] = [1.92 - 0.800] = 1.12$$

99. Use the duration model to approximate the change in the market value (per $100 face value) of two-year loans if interest rates increase by 100 basis points.
A. -$1.756
B. -$1.775
C. +$98.24
D. -$1.000
E. +$1.924

[Refer to: 9-95]

Feedback: Modified Duration

$$MD = \frac{D}{(1 + R)} = \frac{1.92}{(1.0815)} = 1.775$$

Dollar Duration

$$Dollar\ Duration = MD \times P = 1.775 \times 100 = 177.50$$

Change in Price

$$\Delta P = -Dollar\ Duration \times \Delta R = 177.50 \times 0.01 = -\$1.775$$

Based on an 18-month, 8 percent (semiannual) coupon Treasury note selling at par.

100. What is the duration of this Treasury note?
A. 1.500 years.
B. 1.371 years.
C. 1.443 years.
D. 2.882 years.
E. 1.234 years.

[Refer to: 9-95]

Feedback:

$$D = \frac{\left[\frac{4.00}{(1.04)^1} \times 1\right] + \left[\frac{4.00}{(1.04)^2} \times 2\right]\left[\frac{4.00 + 100}{(1.04)^3} \times 3\right]}{100} = 1.443$$

101. If interest rates increase by 20 basis points (i.e., ΔR = 20 basis points), use the duration approximation to determine the approximate price change for the Treasury note.
A. $0.000.
B. $0.2775 per $100 face value.
C. $2.775 per $100 face value.
D. $0.2672 per $100 face value.
E. $2.672 per $100 face value.

[Refer to: 9-95]

Feedback: Modified Duration

$$MD = \frac{D}{(1 + R)} = \frac{1.443}{(1.08)} = 1.336$$

Dollar Duration

$$Dollar\ Duration = MD \times P = 1.336 \times 100 = 133.60$$

Change in Price

$$\Delta P = -Dollar\ Duration \times \Delta R = 133.60 \times 0.002 = -\$0.2672$$

Third Duration Investments has the following assets and liabilities on its balance sheet. The two-year Treasury notes are zero coupon assets. Interest payments on all other assets and liabilities occur at maturity. Assume 360 days in a year.

Assets	Liabilities
\$ 300 million 30-day Treasury bills	\$ 1,150 million 14-day repos
\$ 550 million 90-day Treasury bills	\$ 560 million 1-year commercial paper
\$ 700 million 2-year Treasury notes	\$ 20 million equity
\$ 180 million 180-day municipal notes	

[Reference: 9-102]

102. What is the duration of the assets?
A. 0.708 years.
B. 0.354 years.
C. 0.350 years.
D. 0.955 years.
E. 0.519 years.

[Refer to: 9-102]

Feedback:

Assets	Amount		Proportion		Duration	Prop. × Dur
30-day T-bills	300	300 ÷ 1,730	0.1734	30 ÷ 360	0.083	0.144442
90-day T-bills	550	550 ÷ 1,730	0.3179	90 ÷ 360	0.250	0.079475
2-year T-notes	700	700 ÷ 1,730	0.4046	720 ÷ 360	2.000	0.8092
180-day munis	180	180 ÷ 1,730	0.1041	180 ÷ 360	0.500	0.05205
Total	\$1,730	**Weighted average duration of assets**				**0.9552**

103. What is the duration of the liabilities?
A. 0.708 years.
B. 0.354 years.
C. 0.350 years.
D. 0.955 years.
E. 0.519 years.

[Refer to: 9-102]

Feedback:

Liabilities	Amount		Proportion		Duration	Prop. × Dur
14-day Repo	1,150	1,150 ÷ 1,710	0.6725	14 ÷ 360	0.03889	0.2615
1-year paper	560	560 ÷ 1,710	0.3275	360 ÷ 360	1.000	0.3275
Total	$1,710	**Weighted average duration of liabilities**				**0.3536**

104. What is the leverage-adjusted duration gap?
A. 0.605 years.
B. 0.956 years.
C. 0.360 years.
D. 0.436 years.
E. 0.189 years.

[Refer to: 9-102]

Feedback:

$$[D_A - D_L k] = \left[0.955 - 0.354 \times \left(\frac{1{,}710}{1{,}730}\right)\right] = [0.955 - 0.350] = 0.605$$

Consider a five-year, 8 percent annual coupon bond selling at par of $1,000.

105. What is the duration of this bond?
A. 5 years.
B. 4.31 years.
C. 3.96 years.
D. 5.07 years.
E. Not enough information to answer.

[Refer to: 9-102]

Feedback:

$$D = \frac{\left[\frac{80}{(1.08)^1} \times 1\right] + \left[\frac{80}{(1.08)^2} \times 2\right]\left[\frac{80}{(1.08)^3} \times 3\right]\left[\frac{80}{(1.08)^4} \times 4\right]\left[\frac{80 + 1{,}000}{(1.08)^5} \times 5\right]}{1{,}000} = 4.312$$

106. If interest rates increase by 20 basis points, what is the approximate change in the market price using the duration approximation?
A. -$7.985
B. -$7.941
C. -$3.990
D. +$3.990
E. +$7.949

[Refer to: 9-102]

Feedback: Modified Duration

$$MD = \frac{D}{(1 + R)} = \frac{4.312}{(1.08)} = 3.9926$$

Dollar Duration

$$Dollar\ Duration = MD \times P = 3.9926 \times 1{,}000 = 3{,}992.60$$

Change in Price

$$\Delta P = -Dollar\ Duration \times \Delta R = 3{,}992.60 \times 0.002 = -\$7.985$$

107. Using present value bond valuation techniques, calculate the exact price of the bond after the interest rate increase of 20 basis points.

A. $1,007.94.
B. $992.02.
C. $992.06.
D. $996.01.
E. $1,003.99.

[Refer to: 9-102]

Feedback:

PV = 992.06	FV = 1,000	I = 8.2	N = 5	PMT =80

ΔP = 922.06 - 1,000 = −$7.94
Compare to duration estimate of change −$7.985

The numbers provided by Fourth Bank of Duration are in thousands of dollars.

Treasury bill	$ 90		Time deposits	$1,100
Treasury notes	$ 55		Fed funds sold	$ 230
Treasury bonds	$ 176		Demand deposits	$2,500
Loans	$4,679		Equity	$1,170

Notes: All Treasury bills have six months until maturity. One-year Treasury notes are priced at par and have a coupon of 7 percent paid semiannually. Treasury bonds have an average duration of 4.5 years and the loan portfolio has a duration of 7 years. Time deposits have a 1-year duration and the Fed funds duration is 0.003 years. Fourth Bank of Duration assigns a duration of zero (0) to demand deposits.
[Reference: 9-108]

108. What is the duration of the bank's Treasury portfolio?
A. 1.07 years.
B. 1.00 year.
C. 0.98 years.
D. 0.92 years.
E. Insufficient information.

[Refer to: 9-108]

Feedback: Duration of 1-year Treasury note ($55,000,000, semi-annual coupon)

$$D = \frac{\left[\frac{1{,}925{,}000}{(1.035)^1} \times 1\right] + \left[\frac{1{,}925{,}000 + 55{,}000{,}000}{(1.035)^2} \times 2\right]}{55{,}000{,}000} = 0.9830$$

109. What is the bank's leverage adjusted duration gap?
A. 6.73 years
B. 0.29 years
C. 6.44 years
D. 6.51 years
E. 0 years.

[Refer to: 9-108]

Feedback:

a. Find weighted average duration for all assets and liabilities

Assets	Amount		Proportion		Duration	Prop. × Dur
180-day T-bills	90	90 ÷ 5,000	0.018	180 ÷ 360	0.500	0.009
1-year T-notes	55	55 ÷ 5,000	0.011	360 ÷ 360	0.983	0.011
T-Bonds	176	176 ÷ 5,000	0.0352	Given:	4.500	0.1584
Loans	4,679	4,679 ÷ 5,000	0.9358	Given:	7.000	6.55
Total	$5,000	**Weighted average duration of assets**				**6.73**

b. Find weighted average duration of liabilities

Assets	Amount		Proportion		Duration	Prop.×Dur
Time deposits	1,100	1,100 ÷ 3,830	0.2873	180 ÷ 360	1.000	0.2873
Fed funds sold	230	230 ÷ 3,830	0.0600	Given:	0.003	0.00018
Demand dep.	2,500	2,500 ÷ 3,830	0.6527		0.00	
Total	$3,830	**Weighted average duration of assets**				**0.2875**

c. Find leverage-adjusted duration gap

$$[D_A - D_L k] = \left[6.73 - 0.2875 \times \left(\frac{3{,}830}{5{,}000}\right)\right] = [6.73 - 0.22] = 6.51$$

110. If the relative change in interest rates is a decrease of 1 percent, calculate the impact on the bank's market value of equity using the duration approximation.
(That is, $\Delta R/(1 + R)$ = -1 percent)
A. The bank's market value of equity increases by $325,550.
B. The bank's market value of equity decreases by $325,550.
C. The bank's market value of equity increases by $336,500.
D. The bank's market value of equity decreases by $336,500.
E. There is no change in the bank's market value of equity.

[Refer to: 9-108]

Feedback: Change in the market value of equity, leverage-adjusted duration gap

$$\Delta E = -[D_A - D_L k] \times A \times \frac{\Delta R}{(1+R)} \text{ Where } k = \frac{L}{A}$$

$\Delta E = -6.51 \times \$5{,}000{,}000 \times (-0.01) = +\$325{,}500$

A bond is scheduled to mature in five years. Its coupon rate is 9 percent with interest paid annually. This $1,000 par value bond carries a yield to maturity of 10 percent.

111. A bond is scheduled to mature in five years. Its coupon rate is 9 percent with interest paid annually. This $1,000 par value bond carries a yield to maturity of 10 percent. What is the bond's current market price?
A. $962.09.
B. $961.39.
C. $1,000.
D. $1,038.90.
E. $995.05.

Feedback: $1,000 face value, 9% annual coupon, 5 year maturity, 10% rate

PV = 962.09	FV =1,000	I = 10	N = 5	PMT = 90

112. A bond is scheduled to mature in five years. Its coupon rate is 9 percent with interest paid annually. This $1,000 par value bond carries a yield to maturity of 10 percent. What is the duration of the bond?
A. 4.677 years.
B. 5.000 years.
C. 4.674 years.
D. 4.328 years.
E. 4.223 years

Feedback:

$$D = \frac{\left[\frac{90}{(1.10)^1} \times 1\right] + \left[\frac{90}{(1.10)^2} \times 2\right]\left[\frac{90}{(1.10)^3} \times 3\right]\left[\frac{90}{(1.10)^4} \times 4\right]\left[\frac{90 + 1{,}000}{(1.10)^5} \times 5\right]}{962.09} = 4.223$$

113. A bond is scheduled to mature in five years. Its coupon rate is 9 percent with interest paid annually. This $1,000 par value bond carries a yield to maturity of 10 percent. Calculate the percentage change in this bond's price if interest rates on comparable risk securities decline to 7 percent. Use the duration valuation equation.
A. +8.58 percent
B. +12.76 percent
C. -12.75 percent
D. +11.80 percent
E. +11.52 percent

Feedback:

$$\frac{\Delta P}{P} = -D\left[\frac{R}{1+R}\right] = -4.223\left[\frac{-0.03}{1.10}\right] = -4.223 \times (-0.02727) = +0.1152 \; or \; 11.52\%$$

114. A bond is scheduled to mature in five years. Its coupon rate is 9 percent with interest paid annually. This $1,000 par value bond carries a yield to maturity of 10 percent. Calculate the percentage change in this bond's price if interest rates on comparable risk securities increase to 11 percent. Use the duration valuation equation.
A. +4.25 percent
B. -4.25 percent
C. +8.58 percent
D. -3.93 percent
E. -3.84 percent

Feedback:

$$\frac{\Delta P}{P} = -D\left[\frac{R}{1+R}\right] = -4.223\left[\frac{+0.01}{1.10}\right] = -4.223 \times (-0.0091) = -0.0384 \; or \; -3.84\%$$

Assets	**Amount**	**Rate**	**Duration**
Cash	$75 million		
Loans	$750 million	12 percent	1.75 years
Treasuries	$175 million	9 percent	7.00 years
Liabilities and Equity			
Time Deposits	$350 million	7 percent	1.75 years
CDs	$575 million	8 percent	2.50 years
Equity	$75 million		

[Reference: 9-115]

115. Calculate the duration of the assets to four decimal places.
A. 2.5375 years.
B. 4.3750 years.
C. 1.7500 years.
D. 3.0888 years.
E. 2.5000 years.

[Refer to: 9-115]

Feedback:

Assets	Amount		Proportion		Duration	Prop. × Dur
Cash	75	75 ÷ 1,000	0.075		0.000	0.000
Loans	750	750 ÷ 1,000	0.750		1.75	1.3125
Treasuries	175	175 ÷ 1,000	0.175		7.00	1.2250
Total	$1,000	**Weighted average duration of assets**				**2.5375**

116. Calculate the duration of the liabilities to four decimal places.
A. 2.05 years.
B. 1.75 years.
C. 2.22 years.
D. 2.125 years.
E. 2.50 years.

[Refer to: 9-115]

Feedback:

Assets	Amount		Proportion		Duration	Prop. × Dur
Time deposits	350	350 ÷ 925	0.3784		1.75	0.6622
CDs	575	575 ÷ 925	0.6216		2.50	1.5540
Total	$925	**Weighted average duration of assets**				**2.2162**

117. Calculate the leverage-adjusted duration gap to four decimal places and state the FI's interest rate risk exposure of this institution.
A. +1.0308 years; exposed to interest rate increases.
B. −0.3232 years; exposed to interest rate increases.
C. +0.8666 years; exposed to interest rate increases.
D. +0.4875 years; exposed to interest rate increases.
E. −1.3232 years; exposed to interest rate decreases.

[Refer to: 9-115]

Feedback:

$$[D_A - D_L k] = \left[2.5375 - 2.2162 \times \left(\frac{925}{1{,}000}\right)\right] = [2.5375 - 2.0500] = 0.4875$$

The institution is exposed to increasing interest rates because the market value of assets will decline faster than the market value of liabilities.

118. If all interest rates decline 90 basis points ($\Delta R/(1 + R) = -90$ basis points), what is the change in the market value of equity?
A. -$4.4300 million
B. +$3.9255 million
C. +$4.3875 million
D. +$2.5506 million
E. +$0.0227 million

[Refer to: 9-115]

Feedback: Change in the market value of equity, leverage-adjusted duration gap

$$\Delta E = -[D_A - D_L k] \times A \times \frac{\Delta R}{(1+R)} \quad \text{Where } k = \frac{L}{A}$$

$\Delta E = -0.4875 \times \$1{,}000{,}000{,}000 \times (-0.009) = +\$4{,}378{,}500$

U.S. Treasury quotes from the WSJ on Oct. 15, 2003:

Rate	Maturity	Ask	Change	Ask yield
7.1250	Oct 15, 2005	102:08	-1	5.9156

[Reference: 9-119]

119. What is the duration of the above Treasury note? Use the asked price to calculate the duration. Recall that Treasuries pay interest semiannually.
A. 3.86 years.
B. 1.70 years.
C. 2.10 years.
D. 1.90 years.
E. 3.40 years.

[Refer to: 9-119]

Feedback: In addition to paying interest semi-annually, also recall that Treasuries are quoted on 32^{nds}, so 102:8 = 102 + (8/32) = 102.25

$$D = \frac{\left[\frac{3.5575}{(1.029578)^1} \times 1\right] + \left[\frac{3.5575}{(1.029578)^2} \times 2\right]\left[\frac{3.5575}{(1.029578)^3} \times 3\right]\left[\frac{3.5575 + 100}{(1.029578)^4} \times 4\right]}{102.25} = 1.90$$

120. If yields increase by 10 basis points, what is the approximate price change on the $100,000 Treasury note? Use the duration approximation relationship.
A. +$179.39
B. +$16.05
C. -$1,605.05
D. -$16.05
E. +$160.51

[Refer to: 9-119]

Feedback: Note no semi-annual adjustment needed. Duration is measured in years.

$$\Delta P = -D\left[\frac{R}{1+R}\right] \times P = -1.90\left[\frac{+0.001}{1.059156}\right] \times \$100{,}000 = -1.90 \times (\$94.415)$$

ΔP = $179.39

The numbers provided are in millions of dollars and reflect market values:

Cash		20	Deposits	historical avg. maturity = 4 years; historical average duration = 3.5 years	200
T-Bills	30 days (4.5 percent, par)	50	Certificates of Deposit	avg. maturity = 6 months; avg. duration = 6 months	150
T-Bills	91 days (5.0 percent, par)	60	Short-term Debt	avg. maturity = 4 years	150
Commercial Loans	avg. maturity = 9.0 years; avg. duration = 7.5 years	300	Long-term debt	avg. maturity = 15 years; average duration = 12 years	200
Consumer Loans	avg. maturity = 6.0 years; avg. duration = 4.0 years	200	Equity		130
Mortgage Loans – Fixed rate	avg. maturity = 30 years; avg. duration = 25 years	150			
Mortgage Loans - Adjustable	avg. maturity = 30 years; interest rate reset = 6 months	50			
Total Assets:		830	Total Liabilities & Equity:		830

[Reference: 9-121]

121. The short-term debt consists of 4-year bonds paying an annual coupon of 4 percent and selling at par. What is the duration of the short-term debt?
A. 3.28 years.
B. 3.53 years.
C. 3.78 years.

D. 4.03 years.
E. 4.28 years.

[Refer to: 9-121]

Feedback:

$$D = \frac{\left[\frac{6}{(1.04)^1} \times 1\right] + \left[\frac{6}{(1.04)^2} \times 2\right]\left[\frac{6}{(1.04)^3} \times 3\right]\left[\frac{6+150}{(1.04)^4} \times 4\right]}{1{,}000} = 3.78$$

122. What is the weighted average duration of the assets of the FI?
A. 7.25 years.
B. 7.75 years.
C. 8.25 years.
D. 8.75 years.
E. 9.25 years.

[Refer to: 9-121]

Feedback:

Assets	Amount		Proportion		Duration	Prop.×Dur
Cash	20	20 ÷ 830	0.0241		0	0.00
30-day T-bills	50	50 ÷ 830	0.0602	30 ÷ 365	0.0833	0.0050
91-day T-bills	60	60 ÷ 830	0.0723	91 ÷ 365	0.2493	0.1802
Commercial loans	300	300 ÷ 830	0.3615		7.500	2.7108
Consumer loans	200	200 ÷ 830	0.2410		4.000	0.9639
Mort. Fixed	150	150 ÷ 830	0.1807		25	4.5181
ARMs	50	50 ÷ 830	0.0602		0.500	0.0301
Total	$830	**Weighted average duration of assets**				**8.246**

123. What is the weighted average duration of the liabilities of the FI?
A. 5.00 years.
B. 5.35 years.
C. 5.70 years.
D. 6.05 years.
E. 6.40 years.

[Refer to: 9-121]

Feedback:

Liabilities	Amount		Proportion		Duration	Prop.×Dur
Deposits	200	200 ÷ 700	0.2857		3.5	1.000
CDs	150	150 ÷ 700	0.2143		0.5	0.1072
S.T. Debt	150	150 ÷ 700	0.2143	From #111	3.78	0.8101
L.T. Debt	200	200 ÷ 700	0.2857		12	3.4284
Total	$700	**Weighted average duration of liabilities**				**5.346**

124. What is the leverage-adjusted duration gap of the FI?
A. 3.61 years.
B. 3.74 years.
C. 4.01 years.
D. 4.26 years.
E. 4.51 years.

[Refer to: 9-121]

Feedback:

$$[D_A - D_L k] = \left[8.246 - 5.346 \times \left(\frac{700}{830}\right)\right] = [8.246 - 4.509] = 3.737$$

125. A risk manager could restructure assets and liabilities to reduce interest rate exposure for this example by
A. increasing the average duration of its assets to 9.56 years.
B. decreasing the average duration of its assets to 4.00 years.
C. increasing the average duration of its liabilities to 6.78 years.
D. increasing the average duration of its liabilities to 9.782 years.
E. increasing the leverage ratio, k, to 1.

[Refer to: 9-121]

Feedback: To completely immunize against interest rate changes, set the leverage adjusted duration to zero.

$$[D_A - D_L k] = \left[8.246 - D_L \times \left(\frac{700}{830}\right)\right] = 0.00$$

DL = 8.246 × (830 ÷ 700) = 9.78 years. Option C is the only selection that immunizes against interest rate risk.

126. The shortcomings of this strategy are the following except
A. duration changes as the time to maturity changes, making it difficult to maintain a continuous hedge.
B. estimation of duration is difficult for some accounts such as demand deposits and passbook savings account.
C. it ignores convexity which can be distorting for large changes in interest rates.
D. it is difficult to compute market values for many assets and liabilities.
E. it does not assume a flat term structure, so its estimation is imprecise.

[Refer to: 9-121]

127. What is the effect of a 100 basis point increase in interest rates on the market value of equity of the FI? Use the duration approximation relationship. Assume r = 4 percent.
A. -27.56 million.
B. -28.01 million.
C. -29.85 million.
D. -31.06 million.
E. -33.76 million.

[Refer to: 9-121]

Feedback: Change in the market value of equity, leverage-adjusted duration gap

$$\Delta E = -[D_A - D_L k] \times A \times \frac{\Delta R}{(1+R)} \text{ Where } k = \frac{L}{A}$$

$$\Delta E = -[3.74] \times 830{,}000{,}000 \times \frac{.01}{(1.04)}$$

ΔE = −3.74 × $830,000,000 × (+0.0096) = −$29,848,000 approximate

The following is an FI's balance sheet ($millions).

Assets	Amount	Duration	Liabilities	Amount	Duration
Cash	$ 1	0 years	Dem. Deposits	$100	0 years
FF&RP	20	0.01 years	FF&RP	50	0.01 years
Munis	50	x	CDs	90	1.0 years
Loans	200	y	Net Worth	31	

Notes to Balance Sheet:

Munis are 2-year 6 percent annual coupon municipal notes selling at par. Loans are floating rates, repriced quarterly. Spot discount yields for 91-day Treasury bills are 3.75 percent. CDs are 1-year pure discount certificates of deposit paying 4.75 percent.
[Reference: 9-128]

128. What is the duration of the municipal notes (the value of *x*)?
A. 1.94 years.
B. 2.00 years.
C. 1.00 years.
D. 1.81 years.
E. 0.97 years.

[Refer to: 9-128]

Feedback:

$$D = \frac{\left[\frac{3{,}000{,}000}{(1.06)^1} \times 1\right] + \left[\frac{3{,}000{,}000\ +\ 50{,}000{,}000}{(1.06)^2} \times 2\right]}{50{,}000{,}000} = 1.9434$$

129. What is this bank's interest rate risk exposure, if any?
A. The bank is exposed to decreasing interest rates because it has a negative duration gap of -0.21 years.
B. The bank is exposed to increasing interest rates because it has a negative duration gap of -0.21 years.
C. The bank is exposed to increasing interest rates because it has a positive duration gap of +0.21 years.
D. The bank is exposed to decreasing interest rates because it has a positive duration gap of +0.21 years.
E. The bank is not exposed to interest rate changes since it is running a matched book.

[Refer to: 9-128]

Feedback:

Weighted Average Duration of Assets

Assets	Amount		Proportion		Duration	Prop. × Dur
Cash	1	1 ÷ 271	0.0037		0.00	0.0000
FF & RP	20	20 ÷ 271	0.0738		0.01	0.0007
Munis	50	50 ÷ 271	0.1845		1.94	0.3579
Loans	200	200 ÷ 271	0.7380		0.25	0.1845
Total	$271	**Weighted average duration of assets**				**0.5432**

Weighted Average Duration of Liabilities

Liability	Amount		Proportion		Duration	Prop. × Dur
Demand Deps.	100	100 ÷ 240	0.4167		0.00	0.000
FF & RP	50	50 ÷ 240	0.2083		0.01	0.0021
CDs	90	90 ÷ 240	0.3750		1.00	0.3750
Total	$240	**Weighted average duration of assets**				**0.3771**

Leverage-Adjusted Duration Gap

$$[D_A - D_L k] = \left[0.5432 - 0.3771 \times \left(\frac{240}{271}\right)\right] = [0.5432 - 0.3340] = +0.210$$

130. What will be the impact, if any, on the market value of the bank's equity if all interest rates increase by 75 basis points? (i.e., $\Delta R/(1 + R) = 0.0075$)
A. The market value of equity will decrease by $15,750.
B. The market value of equity will increase by $15,750.
C. The market value of equity will decrease by $426,825.
D. The market value of equity will increase by $426,825.
E. There will be no impact on the market value of equity.

[Refer to: 9-128]

Feedback:

Change in the market value of equity, leverage-adjusted duration gap

$$\Delta E = -[D_A - D_L k] \times A \times \frac{\Delta R}{(1+R)} \text{ Where } k = \frac{L}{A}$$

$\Delta E = -0.21 \times \$271{,}000{,}000 \times (0.0075) = -\$426{,}825$