**Solutions for End-of-Chapter Questions and Problems: Chapter Seven**

* 1. What is the process of *asset transformation* performed by a financial institution? Why does this process often lead to the creation of *interest rate risk*? What is interest rate risk?

* 1. *refinancing risk*? How is refinancing risk part of interest rate risk? If an FI funds long-term fixed-rate assets with short-term liabilities, what will be the impact on earnings of an increase in the rate of interest? A decrease in the rate of interest?

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* 1. What is *reinvestment risk*? How is reinvestment risk part of interest rate risk? If an FI funds short-term assets with long-term liabilities, what will be the impact on earnings of a decrease in the rate of interest? An increase in the rate of interest?

1.4. Consider an FI that issues $100 million of liabilities with one year to maturity to finance the purchase of $100 million of assets with a two year maturity. Suppose that the cost of funds (liabilities) for the FI is 5 percent per year and the interest return on the assets is 8 percent per year.

a. Calculate the FI’s profit spread and dollar value of profit in year 1.

b. Calculate the profit spread and dollar value of profit in year 2, if the FI can refinance its liabilities at 5 percent.

c. If interest rates rise and the FI can borrow new one-year liabilities at 9 percent in the second year, calculate the FI’s profit spread and dollar value of profit in year 2.

d. If interest rates fall and the FI can borrow new one-year liabilities at 3 percent in the second year, calculate the FI’s profit spread and dollar value of profit in year 2.

1.5 Consider an FI that issues $200 million of liabilities with two years to maturity to finance the purchase of $200 million of assets with a one year maturity. Suppose that the cost of funds (liabilities) for the FI is 5 percent per year and the interest return on the assets is 9 percent per year.

a. Calculate the FI’s profit spread and dollar value of profit in year 1.

b. Calculate the profit spread and dollar value of profit in year 2, if the FI can reinvest its assets at 9 percent.

c. If interest rates fall and the FI can invest in one-year assets at 6 percent in the second year, calculate the FI’s profit spread and dollar value of profit in year 2.

d. If interest rates rise and the FI can invest in one-year assets at 11 percent in the second year, calculate the FI’s profit spread and dollar value of profit in year 2.

1.6 A financial institution has the following market value balance sheet structure:

Assets Liabilities and Equity

Cash $1,000 Certificate of deposit $10,000

Bond $10,000 Equity $1,000

Total assets $11,000 Total liabilities and equity $11,000

a. The bond has a 10-year maturity, a fixed-rate coupon of 10 percent paid at the end of each year, and a par value of $10,000. The certificate of deposit has a 1-year maturity and a 6 percent fixed rate of interest. The FI expects no additional asset growth. What will be the net interest income (NII) at the end of the first year? *Note*: Net interest income equals interest income minus interest expense.

b. If at the end of year 1 market interest rates have increased 100 basis points (1 percent), what will be the net interest income for the second year? Is the change in NII caused by reinvestment risk or refinancing risk?

The decrease in net interest income is caused by the increase in financing cost without a

c. Assuming that market interest rates increase 1 percent, the bond will have a value of $9,446 at the end of year 1. What will be the market value of the equity for the FI? Assume that all of the NII in part (a) is used to cover operating expenses or is distributed as dividends.

d. If market interest rates had decreased 100 basis points by the end of year 1, would the market value of equity be higher or lower than $1,000? Why?

e. What factors have caused the changes in operating performance and market value for this firm?

1.7 Two 10-year bonds are being considered for an investment that may have to be liquidated before the maturity of the bonds. The first bond is a 10-year premium bond with a coupon rate higher than its required rate of return, and the second bond is a zero-coupon bond that pays only a lump-sum payment after 10 years with no interest over its life. Which bond would have more interest rate risk? That is, which bond’s price would change by a larger amount for a given change in interest rates? Explain your answer.

1.8 Consider again the two bonds in problem 11. If the investment goal is to leave the assets untouched until maturity, such as for a child’s education or for one’s retirement, which of the two bonds has more interest rate risk? What is the source of this risk?

1.9 What is *credit risk*? Which types of FIs are more susceptible to this type of risk? Why?

1.10 Consider the simple FI balance sheet below (in millions of dollars).

**Before the Withdrawal**

**Assets Liabilities/Equity**

Cash assets $ 20 Deposit $150

Nonliquid

assets 155 Equity 25

$175 $175

Suppose that depositors unexpectedly withdraw $50 million in deposits and the FI receives no new deposits to replace them. Assume that the FI cannot borrow any more funds in the short-term money markets, and because it cannot wait to get better prices for its assets in the future (as it needs the cash now to meet immediate depositor withdrawals), the FI has to sell any nonliquid assets at 75 cents on the dollar. Show the FI’s balance sheet after adjustments are made for the $50 million of deposit withdrawals.

1.11 What is *foreign exchange risk*? What does it mean for an FI to be *net long* in foreign assets? What does it mean for an FI to be *net short* in foreign assets? In each case, what must happen to the foreign exchange rate to cause the FI to suffer losses?

1.12 A U.S. insurance company invests $1,000,000 in a private placement of British bonds. Each bond pays £300 in interest per year for 20 years. If the current exchange rate is £1.564/$, what is the nature of the insurance company’s exchange rate risk? Specifically, what type of exchange rate movement concerns this insurance company?

1.13 Assume that a bank has assets located in London worth £150 million on which it earns an average of 8 percent per year. The bank has £100 million in liabilities on which it pays an average of 6 percent per year. The current spot exchange rate is £1.50/$.

a. If the exchange rate at the end of the year is £2.00/$, will the dollar have appreciated or devalued against the mark?

b. Given the change in the exchange rate, what is the effect in dollars on the net interest income from the foreign assets and liabilities? *Note*: The net interest income is interest income minus interest expense.

c. What is the effect of the exchange rate change on the value of assets and liabilities in dollars?

1.14 Six months ago, Qualitybank, issued a $100 million, one-year maturity CD denominated in euros. On the same date, $60 million was invested in a €-denominated loan and $40 million was invested in a U.S. Treasury bill. The exchange rate on this date was €1.5675/$. Assume no repayment of principal and an exchange rate today of €1.2540/$.

a. What is the current value of the CD principal (in euros and dollars)?

b. What is the current value of the euro-denominated loan principal (in euros and

dollars)?

c. What is the current value of the U.S. Treasury bill (in euros and dollars)?

1. What is Qualitybank’s profit/loss from this transaction (in euros and dollars)?

Solution matrix for problem 27:

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1.15 Suppose you purchase a 10-year, AAA-rated Swiss bond for par that is paying an annual coupon of 6 percent. The bond has a face value of 1,000 Swiss francs (SF). The spot rate at the time of purchase is SF1.15/$. At the end of the year, the bond is downgraded to AA and the yield increases to 8 percent. In addition, the SF appreciates to SF1.05/$.

a. What is the loss or gain to a Swiss investor who holds this bond for a year? What portion of this loss or gain is due to foreign exchange risk? What portion is due to interest rate risk?

b. What is the loss or gain to a U.S. investor who holds this bond for a year? What portion of this loss or gain is due to foreign exchange risk? What portion is due to interest rate risk?

1.16 What is *market risk*? How does this risk affect the operating performance of financial institutions? What actions can be taken by an FI’s management to minimize the effects of this risk?

1.17 Characterize the risk exposure(s) of the following FI transactions by choosing one or more of the risk types listed below:

a. Interest rate risk d. Technology risk

b. Credit risk e. Foreign exchange rate risk

c. Off-balance-sheet risk f. Country or sovereign risk

(1) A bank finances a $10 million, six-year fixed-rate commercial loan by selling one-year certificates of deposit.

(2) An insurance company invests its policy premiums in a long-term municipal bond portfolio.

(3) A French bank sells two-year fixed-rate notes to finance a two-year fixed-rate loan to a British entrepreneur.

(4) A Japanese bank acquires an Austrian bank to facilitate clearing operations.

(5) A mutual fund completely hedges its interest rate risk exposure using forward contingent contracts.

(6) A bond dealer uses his own equity to buy Mexican debt on the less-developed country (LDC) bond market.

(7) A securities firm sells a package of mortgage loans as mortgage-backed securities.

1.18 Consider these four types of risks: credit, foreign exchange, market, and sovereign. These risks can be separated into two pairs of risk types in which each pair consists of two related risk types, with one being a subset of the other. How would you pair off the risk types, and which risk type could be considered a subset of the other type in the pair?