

Solutions for End-of-Chapter Questions and Problems: Chapter One

1. What are five risks common to all financial institutions?

Five risks common to all financial institutions include default or credit risk of assets, interest rate risk caused by maturity mismatches between assets and liabilities, liability withdrawal or liquidity risk, underwriting risk, and operating risks.

2. Explain how economic transactions between household savers of funds and corporate users of funds would occur in a world without financial institutions.

In a world without FIs the users of corporate funds in the economy would have to directly approach the household savers of funds in order to satisfy their borrowing needs.

In this economy, the level of fund flows between household savers and the corporate sector is likely to be quite low. There are several reasons for this. Once they have lent money to a firm by buying its financial claims, households need to monitor, or check, the actions of that firm. They must be sure that the firm's management neither absconds with nor wastes the funds on any projects with low or negative net present values. Such monitoring actions are extremely costly for any given household because they require considerable time and expense to collect sufficiently high-quality information relative to the size of the average household saver's investments. Given this, it is likely that each household would prefer to leave the monitoring to others. In the end, little or no monitoring would be done. The resulting lack of monitoring would reduce the attractiveness and increase the risk of investing in corporate debt and equity.

The net result would be an imperfect allocation of resources in an economy.

3. Identify and explain three economic disincentives that would dampen the flow of funds between household savers of funds and corporate users of funds in an economic world without financial institutions.

Investors generally are averse to directly purchasing securities because of (a) monitoring costs, (b) liquidity costs, and (c) price risk. Monitoring the activities of borrowers requires extensive time, expense, and expertise. As a result, households would prefer to leave this activity to others, and by definition, the resulting lack of monitoring would increase the riskiness of investing in corporate debt and equity markets. The long-term nature of corporate equity and debt securities would likely eliminate at least a portion of those households willing to lend money, as the preference of many for near-cash liquidity would dominate the extra returns which may be available. Finally, the price risk of transactions on the secondary markets would increase without the information flows and services generated by high volume.

4. Identify and explain the two functions FIs perform that would enable the smooth flow of funds from household savers to corporate users.

FIs serve as conduits between users and savers of funds by providing a brokerage function and by engaging in an asset transformation function. The brokerage function can benefit both savers and users of funds and can vary according to the firm. FIs may provide only transaction services, such as discount brokerages, or they also may offer advisory services which help reduce

Money placed in any financial institution will result in a claim on a more diversified portfolio. as long as the returns on different investments are not perfectly *positively* correlated, by exploiting the benefits of size, FIs diversify away significant amounts of portfolio risk—especially the risk specific to the individual firm issuing any given security. This risk diversification allows an FI to predict more accurately its expected return on its asset portfolio. A domestically and globally diversified FI may be able to generate an almost risk-free return on its assets. As a result, it can credibly fulfill its promise to households to supply highly liquid claims with little price or capital value risk. FIs best able to achieve this goal include banks that lend money to many different types of corporate, consumer, and government customers. Insurance companies have investments in many different types of assets. Investments in a mutual fund may generate the greatest diversification benefit because of the fund's investment in a wide array of stocks and fixed income securities. As long as an FI is sufficiently large to gain from diversification and monitoring, its financial claims are likely to be viewed as liquid and attractive to small savers compared with direct investments in the capital market.

12. How can financial institutions invest in high-risk assets with funding provided by low-risk liabilities from savers?

FIs exploit the law of large numbers in their investments, achieving a significant amount of diversification, whereas because of their small size, many household savers are constrained to holding relatively undiversified portfolios. This risk diversification allows an FI to predict more accurately its expected return on its asset portfolio. A domestically and globally diversified FI may be able to generate an almost risk-free return on its assets. As a result, it can credibly fulfill its promise to households to supply highly liquid claims with little price or capital value risk.

13. How can individual savers use financial institutions to reduce the transaction costs of investing in financial assets?

By pooling the assets of many small investors, FIs can gain economies of scale in transaction costs. This benefit occurs whether the FI is lending to a corporate or retail customer, or purchasing assets in the money and capital markets. In either case, operating activities that are designed to deal in large volumes typically are more efficient than those activities designed for small volumes. By grouping their assets in FIs that purchase assets in bulk—such as in mutual funds and pension funds—household savers can reduce the transaction costs of their asset purchases.

14. What is maturity intermediation? What are some of the ways in which the risks of maturity intermediation are managed by financial institutions?

If net borrowers and net lenders have different optimal time horizons, FIs can service both sectors by matching their asset and liability maturities through on- and off-balance sheet hedging activities and flexible access to the financial markets. A dimension of FIs' ability to reduce risk by diversification is that they can better bear the risk of mismatching the maturities of their assets and liabilities than can small household savers. Thus, FIs offer maturity intermediation services to the rest of the economy. Specifically, through maturity mismatching,

a. Return on equity

$$\text{Return on equity} = 5,000\text{m}/28,000\text{m} = 17.86\%$$

b. Return on assets

$$\text{Return on assets} = 5,000\text{m}/183,000\text{m} = 2.73\%$$

c. Asset utilization

$$\text{Asset utilization} = (20,000\text{m} + 2,000\text{m})/183,000\text{m} = 12.02\%$$

d. Equity multiplier

$$\text{Equity multiplier} = 183,000\text{m}/(12,000\text{m} + 4,000\text{m} + 12,000\text{m}) = 6.54\text{X}$$

e. Profit margin

$$\text{Profit margin} = 5,000\text{m}/(20,000\text{m} + 2,000\text{m}) = 22.73\%$$

f. Interest expense ratio

$$\text{Interest expense ratio} = 11,000\text{m}/(20,000\text{m} + 2,000\text{m}) = 50.00\%$$

g. Provision for loan loss ratio

$$\text{Provision for loan loss ratio} = 2,000\text{m}/(20,000\text{m} + 2,000\text{m}) = 9.09\%$$

h. Noninterest expense ratio

$$\text{Noninterest expense ratio} = 1,000\text{m}/(20,000\text{m} + 2,000\text{m}) = 4.55\%$$

i. Tax ratio

$$\text{Tax ratio} = 3,000\text{m}/(20,000\text{m} + 2,000\text{m}) = 13.64\%$$

6. How does the risk of short-term funds differ from the risk of long-term funds?

The principal type of risk for short-term funds is interest rate risk, because of the predominance of fixed-income securities. Because of the shortness of maturity of the assets, which often is less than 60 days, this risk is mitigated to a large extent. Short-term funds generally have virtually no liquidity or default risk because of the types of assets held. An exception occurred during the financial crisis of 2008-2009. In September 2008, Primary Reserve Fund, a large and reputedly conservative money market fund had holdings of \$785 million in commercial paper issued by Lehman. As a result of Lehman's failure, shares in Primary Reserve Fund 'broke the buck' (i.e., fell below \$1), meaning that its investors lost principal. This was the first incidence of a share price dip below a dollar for any money market mutual fund open to the general public. This fund had built a reputation for safe investment. Hence its exposure to Lehman scared investors, leading to a broad run on money market mutual funds. Within a few days more than \$200 billion had flowed out of these funds. The U.S. Treasury stopped the run by extending government insurance to all money market mutual fund accounts held in participating money market funds as of the close of business on September 19, 2008. The insurance coverage lasted for one year (through September 18, 2009).

Long-term equity funds typically are well diversified, and the risk is more systematic or market based. Bond funds have extensive interest rate risk because of their long-term, fixed-rate nature. Sector, or industry-specific, funds have systematic (market) and unsystematic risk, regardless of whether they are equity or bond funds.

7. What are the economic reasons for the existence of mutual funds; that is, what benefits do mutual funds provide for investors? Why do individuals rather than corporations hold most mutual funds?

One major economic reason for the existence of mutual funds is the ability to achieve diversification through risk pooling for small investors. By pooling investments from a large number of small investors, fund managers are able to hold well-diversified portfolios of assets. In addition, managers can obtain lower transaction costs because of the volume of transactions, both in dollars and numbers, and they benefit from research, information, and monitoring activities at reduced costs.

Many small investors are able to gain benefits of the money and capital markets by using mutual funds. Once an account is opened in a fund, a small amount of money can be invested on a periodic basis. In many cases, the amount of the investment would be insufficient for direct access to the money and capital markets. On the other hand, corporations are more likely to be able to diversify by holding a large bundle of individual securities and assets, and money and capital markets are easily accessible by direct investment. Further, an argument can be made that the goal of corporations should be to maximize shareholder wealth, not to be diversified.

8. What are the principal demographics of household owners who own mutual funds? What are the primary reasons why household owners invest in mutual funds?

- b. If interest rates change so that the yields on all of the securities decrease 1 percent, how does the weighted-average maturity of the portfolio change?

To determine the weighted-average maturity of the portfolio for a rate decrease of 1 percent, the new value of each security must be determined. This calculation will require knowing the yield to maturity of each security before the rate change.

T-notes are selling at par, so the yield to maturity = 5 percent. Therefore, the new value will be $PV = \$500,000 \times PVA_{n=5, i=4\%} + \$10,000,000 \times PV_{n=5, i=4\%} = \$10,445,182$.

10-year bonds: Par = \$6,000,000, PV = \$5,800,000, Cpn = 7 percent \Rightarrow YTM = 7.485%. The new PV = $\$420,000 \times PVA_{n=10, i=6.485\%} + \$6,000,000 \times PV_{n=10, i=6.485\%} = \$6,222,161$.

Debentures: Par = \$6,000,000, PV = \$6,200,000, Cpn = 9 percent \Rightarrow 8.644 percent. The new PV = $\$540,000 \times PVA_{n=20, i=7.644\%} + \$6,000,000 \times PV_{n=20, i=7.644\%} = \$6,820,378$.

The total value of the assets after the change in rates will be \$23,487,721, and the weighted-average maturity will be $[5 \times \$10,445,182 + 10 \times \$6,222,030 + 20 \times \$6,820,378] / \$23,487,721 = 250,855,080 / 23,487,721 = 10.68$ years.

- c. Explain the changes in the weighted-average maturity of the portfolio if the yields increase by 1 percent.

When interest rates increase 1 percent, the value of the T-note is \$9,578,764, the value of the 10-year bond is \$5,414,885, and the value of the debenture is \$5,662,851, and the new value of the assets is \$20,656,500. The weighted-average maturity is 10.42 years.

- d. Assume that the insurance company has no other assets. What will be the effect on the market value of the company's equity if the interest rate changes in (b) and (c) occur?

Assuming that the company is financed entirely with equity, the market value will increase \$1,487,721 when interest rates decrease 1 percent, and the market value will decrease \$1,343,500 when rates increase 1 percent. Notice that for the same absolute rate change, the increase in value is greater than the decrease in value.

27. The following is a simplified FI balance sheet:

<u>Assets</u>		<u>Liabilities and Equity</u>	
Loans	\$1,000	Deposits	\$850
		Equity	\$150
Total assets	<u>\$1,000</u>	Total liabilities & equity	<u>\$1,000</u>

The average maturity of loans is four years and the average maturity of deposits is two years. Assume loan and deposit balances are reported as book value, zero-coupon items.

Level 1 assets = \$12 + \$19 + \$125 =	156
Level 2A assets = (\$94 + \$138) x 0.85 = \$197.20	
Capped at 40% of high-quality liquid assets = \$156 x 0.40 =	<u>62.4</u>
Stock of high-quality liquid assets	\$218.4
Level 2B assets = \$106 x 0.50 = \$53.00	40% cap on Level 2 assets already met <u>0.0</u>
	Stock of high-quality liquid assets \$218.4
Cash outflows:	
Stable retail deposits	\$55 x 0.03 = \$ 1.65
Less stable retail deposits	\$20 x 0.10 = 2.00
Stable small business deposits	\$80 x 0.05 = 4.00
Less stable small business deposits	\$49 x 0.10 = 4.90
Non-financial corporates	\$250 x 0.75 = <u>187.50</u>
Total cash outflows over next 30 days	\$200.05
Total cash inflows over next 30 days	<u>5.50</u>
Total net cash outflows over next 30 days	\$194.55

Liquidity coverage ratio = \$218.4m/\$194.55m = 112.26%. The bank is in compliance with liquidity requirements based on the LCR.

19. FirstBank has the following balance sheet (in millions of dollars).

Assets		Required stable Funding factor	Liabilities and Equity		Available stable funding factor
Cash	\$ 12	0%	Stable retail deposits	\$ 55	95%
Deposits at the Fed	19	0	Less stable retail deposits	20	90
Treasury securities	125	5	Unsecured wholesale funding from:		
GNMA securities	94	15	Stable small business deposits	80	95
Loans to A rated corporations	138	65	Less stable small business deposits	49	90
(maturity > 1 year)			Nonfinancial corporates	250	50
Loans to B rated corporations	106	50	Equity	<u>60</u>	100
(maturity < 1 year)			Total	\$514	
Premises	<u>20</u>	100			
Total	\$514				

Calculate the NSFR for FirstBank.

The net stable funding ratio for FirstBank is calculated as follows:

Available amount of stable funding =

$$\$60 \times 1.00 + (\$55 + \$80) \times 0.95 + (\$20 + \$49) \times 0.90 + \$250 \times 0.50 = \$375.35\text{m}$$

Required amount of stable funding =

$$(\$12 + \$19) \times 0.00 + \$125 \times 0.05 + \$94 \times 0.15 + \$138 \times 0.65 + \$106 \times 0.50 + \$20 \times 1.00 = \$183.05\text{m}$$

The benefits of loan sales to an FI:

- (a) They remove bad loans from the balance sheet, freeing resources for other investments as well as improving the FI's portfolio composition.
- (b) They may signal to market investors that the FI is in a position to bear losses. This hypothesis has been confirmed by empirical studies showing stock prices reacting favorably to news of FIs adding additional reserves to cover loan reserves.
- (c) Losses can be deducted, providing write-offs for the FI.

The costs of loan sales to an FI:

- (a) There is an actual loss equal to the tax adjusted difference between the face value of the loan and its market value at the time of sale.
- (b) Secondary loan prices are very volatile and can fluctuate dramatically, making the planning of the optimal time to sell-off difficult.

27. What are the major costs and benefits of converting loans to bonds for an FI?

The advantage of converting loans to bonds for an FI is the increased liquidity, which makes bonds an attractive instrument to hold. Because of the full or partial collateral backing, these bonds are also normally senior in status to any remaining loans or sovereign bonds of that country. A disadvantage is that bonds have much longer maturities and there is usually a loss entailed because the restructured value of the bond is usually lower than the present value of the loan.

After subtracting the average daily balance of vault cash of \$1 million, the bank needs to maintain a target daily average of \$17.813 million (\$18.813 million - \$1 million) during the maintenance period.

- b. Is the bank in compliance with the requirements?

The maintenance period begins on Thursday, May 11th.

Average Reserves at Fed = \$18m + \$27m + \$27m + \$27m + \$20m + \$35m + \$21m + \$18m + \$28m + \$28m + \$28m + \$19m + \$19m + \$21m = \$336m/14 = \$24m.

Excess over required reserves = \$24m - \$17.813 = \$6.187m

- c. What amount of required reserves can be carried over to the following computation period?

Excess that can be carried over = 0.04 x \$18.813 million = \$0.7525 million.

- d. If the average cost of funds to the bank is 8 percent per year and deposits at the Fed pay 0.5 percent, what is the effect on the income statement for this bank for this reserve period?

Loss = (6.187m - 0.7525m) x (0.080 - 0.005)(14/365) = \$15,6933.49.

10. City Bank has estimated that its average daily net transaction accounts balance over the recent 14-day reserve computation period was \$225 million. The average daily balance with the Fed over the 14-day maintenance period was \$9 million, and the average daily balance of vault cash over the two-week computation period was \$7.5 million.

- a. Under the rules effective in 2015, what is the amount of average daily reserves required to be held during the reserve maintenance period for these net transaction accounts balances?

Reserve requirements = (0 x \$14.5m) + (\$103.6m - \$14.5m)(0.03) + (\$225m - \$103.6m) (0.10)
= 0 + \$2.673m + \$12.140m = \$14.813 million

After subtracting the average daily balance of vault cash of \$7.5 million, the bank needs to maintain a daily average of \$7.313 million (\$14.813 million - \$7.5 million) during the maintenance period.

- b. What is the average daily balance of reserves held by the bank over the maintenance period? By what amount were the average reserves held higher or lower than the required reserves?

The average daily balance over the maintenance period was \$7 million. Therefore, average reserves held were short \$0.313 million.

First, the Black-Scholes model assumes unrealistically that short-term interest rates are constant, which they generally are not. Second, the model assumes that the variance of returns on the underlying asset is constant over time. In fact, the variance may increase in the initial life of a bond, but it must decrease during the final stages of the bond's life because the bond must trade at par at maturity. The decrease in variance of returns over the final portion of a bond's life is called the pull-to-par.

11. An FI has purchased a two-year, \$1,000 par value zero-coupon bond for \$867.43. The FI will hold the bond to maturity unless it needs to sell the bond at the end of one year for liquidity purposes. The current one-year interest rate is 7 percent and the one-year rate in one year is forecast to be either 8.04 percent or 7.44 percent with equal likelihood. The FI wishes to buy a put option to protect itself against a capital loss if the bond needs to be sold in one year.

- a. What is the yield on the bond at the time of purchase?

$$PV_0 = FV \times PVIF_{n=2, i=?} \Rightarrow \$867.43 = \$1,000 \times PVIF_{n=2, i=?} \Rightarrow i = 7.37 \text{ percent}$$

- b. What is the market-determined, implied one-year rate one year before maturity?

$$E(r_1) = (0.5 \times 8.04 \text{ percent}) + (0.5 \times 7.44 \text{ percent}) = 7.74 \text{ percent}$$

- c. What is the expected sale price if the bond has to be sold at the end of one year?

$$E(P_1) = \$1,000 / (1.0774) = \$928.16$$

- d. Diagram the bond prices over the two-year horizon.