

with higher interest rates. As mentioned earlier, this process of asset transformation is frequently described by saying that banks are in the business of “borrowing short and lending long.” For example, if the loans have an interest rate of 10% per year, the bank earns \$9 in income from its loans over the year. If the \$100 of checkable deposits is in a NOW account with a 5% interest rate and it costs another \$3 per year to service the account, the cost per year of these deposits is \$8. The bank’s profit on the new deposits is then \$1 per year (a 1% return on assets).

## General Principles of Bank Management

Now that you have some idea of how a bank operates, let’s look at how a bank manages its assets and liabilities in order to earn the highest possible profit. The bank manager has four primary concerns. The first is to make sure that the bank has enough ready cash to pay its depositors when there are **deposit outflows**, that is, when deposits are lost because depositors make withdrawals and demand payment. To keep enough cash on hand, the bank must engage in **liquidity management**, the acquisition of sufficiently liquid assets to meet the bank’s obligations to depositors. Second, the bank manager must pursue an acceptably low level of risk by acquiring assets that have a low rate of default and by diversifying asset holdings (**asset management**). The third concern is to acquire funds at low cost (**liability management**). Finally, the manager must decide the amount of capital the bank should maintain and then acquire the needed capital (**capital adequacy management**).

To understand bank and other financial institution management fully, we must go beyond the general principles of bank asset and liability management described next and look in more detail at how a financial institution manages its assets. The two sections following this one provide an in-depth discussion of how a financial institution manages **credit risk**, the risk arising because borrowers may default, and how it manages **interest-rate risk**, the riskiness of earnings and returns on bank assets that results from interest-rate changes.

### Liquidity Management and the Role of Reserves

Let us see how a typical bank, the First National Bank, can deal with deposit outflows that occur when its depositors withdraw cash from checking or savings accounts or write checks that are deposited in other banks. In the example that follows, we assume that the bank has ample excess reserves and that all deposits have the same required reserve ratio of 10% (the bank is required to keep 10% of its time and checkable deposits as reserves). Suppose that the First National Bank’s initial balance sheet is as follows:

| Assets     |              | Liabilities  |               |
|------------|--------------|--------------|---------------|
| Reserves   | \$20 million | Deposits     | \$100 million |
| Loans      | \$80 million | Bank capital | \$ 10 million |
| Securities | \$10 million |              |               |

The bank’s required reserves are 10% of \$100 million, or \$10 million. Since it holds \$20 million of reserves, the First National Bank has excess reserves of \$10 million. If a deposit outflow of \$10 million occurs, the bank’s balance sheet becomes:

| Assets     |              | Liabilities  |              |
|------------|--------------|--------------|--------------|
| Reserves   | \$10 million | Deposits     | \$90 million |
| Loans      | \$80 million | Bank capital | \$10 million |
| Securities | \$10 million |              |              |

The bank loses \$10 million of deposits *and* \$10 million of reserves, but since its required reserves are now 10% of only \$90 million (\$9 million), its reserves still exceed this amount by \$1 million. In short, ***if a bank has ample reserves, a deposit outflow does not necessitate changes in other parts of its balance sheet.***

The situation is quite different when a bank holds insufficient excess reserves. Let's assume that instead of initially holding \$10 million in excess reserves, the First National Bank makes loans of \$10 million, so that it holds no excess reserves. Its initial balance sheet would be:

| Assets     |              | Liabilities  |               |
|------------|--------------|--------------|---------------|
| Reserves   | \$10 million | Deposits     | \$100 million |
| Loans      | \$90 million | Bank capital | \$ 10 million |
| Securities | \$10 million |              |               |

When it suffers the \$10 million deposit outflow, its balance sheet becomes:

| Assets     |              | Liabilities  |              |
|------------|--------------|--------------|--------------|
| Reserves   | \$ 0         | Deposits     | \$90 million |
| Loans      | \$90 million | Bank capital | \$10 million |
| Securities | \$10 million |              |              |

After \$10 million has been withdrawn from deposits and hence reserves, the bank has a problem: It has a reserve requirement of 10% of \$90 million, or \$9 million, but it has no reserves! To eliminate this shortfall, the bank has four basic options. One is to acquire reserves to meet a deposit outflow by borrowing them from other banks in the federal funds market or by borrowing from corporations.<sup>1</sup> If the First National Bank acquires the \$9 million shortfall in reserves by borrowing it from other banks or corporations, its balance sheet becomes:

| Assets     |              | Liabilities                                    |              |
|------------|--------------|--|--------------|
| Reserves   | \$ 9 million | Deposits                                       | \$90 million |
| Loans      | \$90 million | Borrowings from other<br>banks or corporations | \$ 9 million |
| Securities | \$10 million | Bank capital                                   | \$10 million |

<sup>1</sup>One way that the First National Bank can borrow from other banks and corporations is by selling negotiable certificates of deposit. This method for obtaining funds is discussed in the section on liability management.

The cost of this activity is the interest rate on these borrowings, such as the federal funds rate.

A second alternative is for the bank to sell some of its securities to help cover the deposit outflow. For example, it might sell \$9 million of its securities and deposit the proceeds with the Fed, resulting in the following balance sheet:

| Assets     |              | Liabilities  |              |
|------------|--------------|--------------|--------------|
| Reserves   | \$ 9 million | Deposits     | \$90 million |
| Loans      | \$90 million | Bank capital | \$10 million |
| Securities | \$ 1 million |              |              |

The bank incurs some brokerage and other transaction costs when it sells these securities. The U.S. government securities that are classified as secondary reserves are very liquid, so the transaction costs of selling them are quite modest. However, the other securities the bank holds are less liquid, and the transaction cost can be appreciably higher.

A third way that the bank can meet a deposit outflow is to acquire reserves by borrowing from the Fed. In our example, the First National Bank could leave its security and loan holdings the same and borrow \$9 million in discount loans from the Fed. Its balance sheet would be:

| Assets     |              | Liabilities    |              |
|------------|--------------|----------------|--------------|
| Reserves   | \$ 9 million | Deposits       | \$90 million |
| Loans      | \$90 million | Discount loans |              |
| Securities | \$10 million | from the Fed   | \$ 9 million |
|            |              | Bank capital   | \$10 million |

The cost associated with discount loans is the interest rate that must be paid to the Fed (called the **discount rate**).

Finally, a bank can acquire the \$9 million of reserves to meet the deposit outflow by reducing its loans by this amount and depositing the \$9 million it then receives with the Fed, thereby increasing its reserves by \$9 million. This transaction changes the balance sheet as follows:

| Assets     |              | Liabilities  |              |
|------------|--------------|--------------|--------------|
| Reserves   | \$ 9 million | Deposits     | \$90 million |
| Loans      | \$81 million | Bank capital | \$10 million |
| Securities | \$10 million |              |              |

The First National Bank is once again in good shape because its \$9 million of reserves satisfies the reserve requirement.

However, this process of reducing its loans is the bank's costliest way of acquiring reserves when there is a deposit outflow. If the First National Bank has numerous short-term loans renewed at fairly short intervals, it can reduce its total amount of

loans outstanding fairly quickly by *calling in* loans—that is, by not renewing some loans when they come due. Unfortunately for the bank, this is likely to antagonize the customers whose loans are not being renewed because they have not done anything to deserve such treatment. Indeed, they are likely to take their business elsewhere in the future, a very costly consequence for the bank.

A second method for reducing its loans is for the bank to sell them off to other banks. Again, this is very costly because other banks do not personally know the customers who have taken out the loans and so may not be willing to buy the loans at their full value (This is just the lemons adverse selection problem described in Chapter 8.)

The foregoing discussion explains why banks hold excess reserves even though loans or securities earn a higher return. When a deposit outflow occurs, holding excess reserves allows the bank to escape the costs of (1) borrowing from other banks or corporations, (2) selling securities, (3) borrowing from the Fed, or (4) calling in or selling off loans. ***Excess reserves are insurance against the costs associated with deposit outflows. The higher the costs associated with deposit outflows, the more excess reserves banks will want to hold.***

Just as you and I would be willing to pay an insurance company to insure us against a casualty loss such as the theft of a car, a bank is willing to pay the cost of holding excess reserves (the opportunity cost, which is the earnings forgone by not holding income-earning assets such as loans or securities) in order to insure against losses due to deposit outflows. Because excess reserves, like insurance, have a cost, banks also take other steps to protect themselves; for example, they might shift their holdings of assets to more liquid securities (secondary reserves).

### Study Guide

Bank management is easier to grasp if you put yourself in the banker's shoes and imagine what you would do in the situations described. To understand a bank's possible responses to deposit outflows, imagine how you as a banker might respond to two successive deposit outflows of \$10 million.

### Asset Management

Now that you understand why a bank has a need for liquidity, we can examine the basic strategy a bank pursues in managing its assets. To maximize its profits, a bank must simultaneously seek the highest returns possible on loans and securities, reduce risk, and make adequate provisions for liquidity by holding liquid assets. Banks try to accomplish these three goals in four basic ways.

First, banks try to find borrowers who will pay high interest rates and are unlikely to default on their loans. They seek out loan business by advertising their borrowing rates and by approaching corporations directly to solicit loans. It is up to the bank's loan officer to decide if potential borrowers are good credit risks who will make interest and principal payments on time (i.e., engage in screening to reduce the adverse selection problem). Typically, banks are conservative in their loan policies; the default rate is usually less than 1%. It is important, however, that banks not be so conservative that they miss out on attractive lending opportunities that earn high interest rates.

Second, banks try to purchase securities with high returns and low risk. Third, in managing their assets, banks must attempt to lower risk by diversifying. They accomplish this by purchasing many different types of assets (short- and long-term, U.S. Treasury, and municipal bonds) and approving many types of loans to a number of

customers. Banks that have not sufficiently sought the benefits of diversification often come to regret it later. For example, banks that had overspecialized in making loans to energy companies, real estate developers, or farmers suffered huge losses in the 1980s with the slump in energy, property, and farm prices. Indeed, many of these banks went broke because they had “put too many eggs in one basket.”

Finally, the bank must manage the liquidity of its assets so that it can satisfy its reserve requirements without bearing huge costs. This means that it will hold liquid securities even if they earn a somewhat lower return than other assets. The bank must decide, for example, how much in excess reserves must be held to avoid costs from a deposit outflow. In addition, it will want to hold U.S. government securities as secondary reserves so that even if a deposit outflow forces some costs on the bank, these will not be terribly high. Again, it is not wise for a bank to be too conservative. If it avoids all costs associated with deposit outflows by holding only excess reserves, losses are suffered because reserves earn no interest, while the bank's liabilities are costly to maintain. The bank must balance its desire for liquidity against the increased earnings that can be obtained from less liquid assets such as loans.

## Liability Management

Before the 1960s, liability management was a staid affair: For the most part, banks took their liabilities as fixed and spent their time trying to achieve an optimal mix of assets. There were two main reasons for the emphasis on asset management. First, over 60% of the sources of bank funds were obtained through checkable (demand) deposits that by law could not pay any interest. Thus banks could not actively compete with one another for these deposits by paying interest on them, and so their amount was effectively a given for an individual bank. Second, because the markets for making overnight loans between banks were not well developed, banks rarely borrowed from other banks to meet their reserve needs.

Starting in the 1960s, however, large banks (called **money center banks**) in key financial centers, such as New York, Chicago, and San Francisco, began to explore ways in which the liabilities on their balance sheets could provide them with reserves and liquidity. This led to an expansion of overnight loan markets, such as the federal funds market, and the development of new financial instruments such as negotiable CDs (first developed in 1961), which enabled money center banks to acquire funds quickly.<sup>2</sup>

This new flexibility in liability management meant that banks could take a different approach to bank management. They no longer needed to depend on checkable deposits as the primary source of bank funds and as a result no longer treated their sources of funds (liabilities) as given. Instead, they aggressively set target goals for their asset growth and tried to acquire funds (by issuing liabilities) as they were needed.

For example, today, when a money center bank finds an attractive loan opportunity, it can acquire funds by selling a negotiable CD. Or, if it has a reserve shortfall, funds can be borrowed from another bank in the federal funds market without incurring high transaction costs. The federal funds market can also be used to finance loans. Because of the increased importance of liability management, most banks now

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<sup>2</sup>Because small banks are not as well known as money center banks and so might be a higher credit risk, they find it harder to raise funds in the negotiable CD market. Hence they do not engage nearly as actively in liability management.

manage both sides of the balance sheet together in a so-called asset–liability management (ALM) committee.

The emphasis on liability management explains some of the important changes over the past three decades in the composition of banks' balance sheets. While negotiable CDs and bank borrowings have greatly increased in importance as a source of bank funds in recent years (rising from 2% of bank liabilities in 1960 to 42% by the end of 2002), checkable deposits have decreased in importance (from 61% of bank liabilities in 1960 to 9% in 2002). Newfound flexibility in liability management and the search for higher profits have also stimulated banks to increase the proportion of their assets held in loans, which earn higher income (from 46% of bank assets in 1960 to 64% in 2002).

## Capital Adequacy Management

Banks have to make decisions about the amount of capital they need to hold for three reasons. First, bank capital helps prevent *bank failure*, a situation in which the bank cannot satisfy its obligations to pay its depositors and other creditors and so goes out of business. Second, the amount of capital affects returns for the owners (equity holders) of the bank. And third, a minimum amount of bank capital (bank capital requirements) is required by regulatory authorities.

**How Bank Capital Helps Prevent Bank Failure.** Let's consider two banks with identical balance sheets, except that the High Capital Bank has a ratio of capital to assets of 10% while the Low Capital Bank has a ratio of 4%.

| HIGH CAPITAL BANK |              |              |              | LOW CAPITAL BANK |              |              |              |
|-------------------|--------------|--------------|--------------|------------------|--------------|--------------|--------------|
| Assets            |              | Liabilities  |              | Assets           |              | Liabilities  |              |
| Reserves          | \$10 million | Deposits     | \$90 million | Reserves         | \$10 million | Deposits     | \$96 million |
| Loans             | \$90 million | Bank capital | \$10 million | Loans            | \$90 million | Bank capital | \$ 4 million |

Suppose that both banks get caught up in the euphoria of the telecom market, only to find that \$5 million of their telecom loans became worthless later. When these bad loans are written off (valued at zero), the total value of assets declines by \$5 million, and so bank capital, which equals total assets minus liabilities, also declines by \$5 million. The balance sheets of the two banks now look like this:

| HIGH CAPITAL BANK |              |              |              | LOW CAPITAL BANK |              |              |               |
|-------------------|--------------|--------------|--------------|------------------|--------------|--------------|---------------|
| Assets            |              | Liabilities  |              | Assets           |              | Liabilities  |               |
| Reserves          | \$10 million | Deposits     | \$90 million | Reserves         | \$10 million | Deposits     | \$96 million  |
| Loans             | \$85 million | Bank capital | \$ 5 million | Loans            | \$85 million | Bank capital | –\$ 1 million |

The High Capital Bank takes the \$5 million loss in stride because its initial cushion of \$10 million in capital means that it still has a positive net worth (bank capital) of \$5 million after the loss. The Low Capital Bank, however, is in big trouble. Now the value of its assets has fallen below its liabilities, and its net worth is now  $-\$1$  million. Because the bank has a negative net worth, it is insolvent: It does not have sufficient assets to pay off all holders of its liabilities (creditors). When a bank becomes insolvent, government regulators close the bank, its assets are sold off, and its managers are fired. Since the owners of the Low Capital Bank will find their investment wiped out, they would clearly have preferred the bank to have had a large enough cushion of bank capital to absorb the losses, as was the case for the High Capital Bank. We therefore see an important rationale for a bank to maintain a high level of capital: *A bank maintains bank capital to lessen the chance that it will become insolvent.*

**How the Amount of Bank Capital Affects Returns to Equity Holders.** Because owners of a bank must know whether their bank is being managed well, they need good measures of bank profitability. A basic measure of bank profitability is the **return on assets (ROA)**, the net profit after taxes per dollar of assets:

$$\text{ROA} = \frac{\text{net profit after taxes}}{\text{assets}}$$

The return on assets provides information on how efficiently a bank is being run, because it indicates how much profits are generated on average by each dollar of assets.

However, what the bank's owners (equity holders) care about most is how much the bank is earning on their equity investment. This information is provided by the other basic measure of bank profitability, the **return on equity (ROE)**, the net profit after taxes per dollar of equity (bank) capital:

$$\text{ROE} = \frac{\text{net profit after taxes}}{\text{equity capital}}$$

There is a direct relationship between the return on assets (which measures how efficiently the bank is run) and the return on equity (which measures how well the owners are doing on their investment). This relationship is determined by the so-called **equity multiplier (EM)**, which is the amount of assets per dollar of equity capital:

$$\text{EM} = \frac{\text{assets}}{\text{equity capital}}$$

To see this, we note that:

$$\frac{\text{net profit after taxes}}{\text{equity capital}} = \frac{\text{net profit after taxes}}{\text{assets}} \times \frac{\text{assets}}{\text{equity capital}}$$

which, using our definitions, yields:

$$\text{ROE} = \text{ROA} \times \text{EM} \tag{1}$$

The formula in Equation 1 tells us what happens to the return on equity when a bank holds a smaller amount of capital (equity) for a given amount of assets. As we have seen, the High Capital Bank initially has \$100 million of assets and \$10 million of equity, which gives it an equity multiplier of 10 ( $= \$100 \text{ million}/\$10 \text{ million}$ ). The

Low Capital Bank, by contrast, has only \$4 million of equity, so its equity multiplier is higher, equaling 25 ( $= \$100 \text{ million}/\$4 \text{ million}$ ). Suppose that these banks have been equally well run so that they both have the same return on assets, 1%. The return on equity for the High Capital Bank equals  $1\% \times 10 = 10\%$ , while the return on equity for the Low Capital Bank equals  $1\% \times 25 = 25\%$ . The equity holders in the Low Capital Bank are clearly a lot happier than the equity holders in the High Capital Bank because they are earning more than twice as high a return. We now see why owners of a bank may not want it to hold too much capital. **Given the return on assets, the lower the bank capital, the higher the return for the owners of the bank.**

**Trade-off Between Safety and Returns to Equity Holders.** We now see that bank capital has benefits and costs. Bank capital benefits the owners of a bank in that it makes their investment safer by reducing the likelihood of bankruptcy. But bank capital is costly because the higher it is, the lower will be the return on equity for a given return on assets. In determining the amount of bank capital, managers must decide how much of the increased safety that comes with higher capital (the benefit) they are willing to trade off against the lower return on equity that comes with higher capital (the cost).

In more uncertain times, when the possibility of large losses on loans increases, bank managers might want to hold more capital to protect the equity holders. Conversely, if they have confidence that loan losses won't occur, they might want to reduce the amount of bank capital, have a high equity multiplier, and thereby increase the return on equity.

**Bank Capital Requirements.** Banks also hold capital because they are required to do so by regulatory authorities. Because of the high costs of holding capital for the reasons just described, bank managers often want to hold less bank capital relative to assets than is required by the regulatory authorities. In this case, the amount of bank capital is determined by the bank capital requirements. We discuss the details of bank capital requirements and why they are such an important part of bank regulation in Chapter 11.

## Application

### Strategies for Managing Bank Capital



Suppose that as the manager of the First National Bank, you have to make decisions about the appropriate amount of bank capital. Looking at the balance sheet of the bank, which like the High Capital Bank has a ratio of bank capital to assets of 10% (\$10 million of capital and \$100 million of assets), you are concerned that the large amount of bank capital is causing the return on equity to be too low. You conclude that the bank has a capital surplus and should increase the equity multiplier to increase the return on equity. What should you do?

To lower the amount of capital relative to assets and raise the equity multiplier, you can do any of three things: (1) You can reduce the amount of bank capital by buying back some of the bank's stock. (2) You can reduce the bank's capital by paying out higher dividends to its stockholders, thereby reducing the bank's retained earnings. (3) You can keep bank capital constant but increase the bank's assets by acquiring new funds—say, by issuing CDs—and then seeking out loan business or purchasing more securities with these new funds. Because you think that it would enhance your position with the



stockholders, you decide to pursue the second alternative and raise the dividend on the First National Bank stock.

Now suppose that the First National Bank is in a similar situation to the Low Capital Bank and has a ratio of bank capital to assets of 4%. You now worry that the bank is short on capital relative to assets because it does not have a sufficient cushion to prevent bank failure. To raise the amount of capital relative to assets, you now have the following three choices: (1) You can raise capital for the bank by having it issue equity (common stock). (2) You can raise capital by reducing the bank's dividends to shareholders, thereby increasing retained earnings that it can put into its capital account. (3) You can keep capital at the same level but reduce the bank's assets by making fewer loans or by selling off securities and then using the proceeds to reduce its liabilities. Suppose that raising bank capital is not easy to do at the current time because capital markets are tight or because shareholders will protest if their dividends are cut. Then you might have to choose the third alternative and decide to shrink the size of the bank.

In past years, many banks experienced capital shortfalls and had to restrict asset growth, as you might have to do if the First National Bank were short of capital. The important consequences of this for the credit markets are discussed in the application that follows.

## Application

### Did the Capital Crunch Cause a Credit Crunch in the Early 1990s?



During the 1990–1991 recession and the year following, there occurred a slowdown in the growth of credit that was unprecedented in the post–World War II era. Many economists and politicians have claimed that there was a “credit crunch” during this period in which credit was hard to get, and as a result the performance of the economy in 1990–1992 was very weak. Was the slowdown in credit growth a manifestation of a credit crunch, and if so, what caused it?

Our analysis of how a bank manages bank capital suggests that a credit crunch was likely to have occurred in 1990–1992 and that it was caused at least in part by the so-called capital crunch in which shortfalls of bank capital led to slower credit growth.

The period of the late 1980s saw a boom and then a major bust in the real estate market that led to huge losses for banks on their real estate loans. As our example of how bank capital helps prevent bank failures demonstrates, the loan losses caused a substantial fall in the amount of bank capital. At the same time, regulators were raising capital requirements (a subject discussed in Chapter 11). The resulting capital shortfalls meant that banks had to either raise new capital or restrict their asset growth by cutting back on lending. Because of the weak economy at the time, raising new capital was extremely difficult for banks, so they chose the latter course. Banks did restrict their lending, and borrowers found it harder to obtain loans, leading to complaints from banks' customers. Only with the stronger recovery of the economy in 1993, helped by a low-interest-rate policy at the Federal Reserve, did these complaints subside.