Module 25 Banking and Money Creation

What you will learn in this Module:

- The role of banks in the economy
- The reasons for and types of banking regulation
- How banks create money

The Monetary Role of Banks

More than half of M1, the narrowest definition of the money supply, consists of currency in circulation—$1 bills, $5 bills, and so on. It's obvious where currency comes from: it's printed by the U.S. Treasury. But the rest of M1 consists of bank deposits, and deposits account for the great bulk of M2, the broader definition of the money supply. By either measure, then, bank deposits are a major component of the money supply. And this fact brings us to our next topic: the monetary role of banks.

What Banks Do

A bank is a *financial intermediary* that uses liquid assets in the form of bank deposits to finance the illiquid investments of borrowers. Banks can create liquidity because it isn't necessary for a bank to keep all of the funds deposited with it in the form of highly liquid assets. Except in the case of a *bank run*—which we'll get to shortly—all of a bank's depositors won't want to withdraw their funds at the same time. So a bank can provide its depositors with liquid assets yet still invest much of the depositors' funds in illiquid assets, such as mortgages and business loans.

Banks can't, however, lend out all the funds placed in their hands by depositors because they have to satisfy any depositor who wants to withdraw his or her funds. In order to meet these demands, a bank must keep substantial quantities of liquid assets on hand. In the modern U.S. banking system, these assets take the form either of currency in the bank's vault or deposits held in the bank's own account at the Federal Reserve. As we'll see shortly, the latter can be converted into currency more or less instantly. Currency in bank vaults and bank deposits held at the Federal Reserve are called **bank reserves.** Because bank reserves are in bank vaults and at the Federal Reserve, not held by the public, they are not part of currency in circulation.

To understand the role of banks in determining the money supply, we start by introducing a simple tool for analyzing a bank's financial position: a **T-account.** A business's T-account summarizes its financial position by showing, in a single table, the

Bank reserves are the currency banks hold in their vaults plus their deposits at the Federal Reserve.

A **T-account** is a tool for analyzing a business's financial position by showing, in a single table, the business's assets (on the left) and liabilities (on the right).

figure 25.1

A T-Account for Samantha's Smoothies

A T-account summarizes a business's financial position. Its assets, in this case consisting of a building and some smoothie-making machinery, are on the left side. Its liabilities, consisting of the money it owes to a local bank, are on the right side.

Assets		Liabilities	
Building	$30,000	Loan from bank	$20,000
Smoothie-making machines	$15,000		

The **reserve ratio** is the fraction of bank deposits that a bank holds as reserves.

The **required reserve ratio** is the smallest fraction of deposits that the Federal Reserve allows banks to hold.

business's assets and liabilities, with assets on the left and liabilities on the right. Figure 25.1 shows the T-account for a hypothetical business that *isn't* a bank—Samantha's Smoothies. According to Figure 25.1, Samantha's Smoothies owns a building worth $30,000 and has $15,000 worth of smoothie-making equipment. These are assets, so they're on the left side of the table. To finance its opening, the business borrowed $20,000 from a local bank. That's a liability, so the loan is on the right side of the table. By looking at the T-account, you can immediately see what Samantha's Smoothies owns and what it owes. Oh, and it's called a T-account because the lines in the table make a T-shape.

Samantha's Smoothies is an ordinary, nonbank business. Now let's look at the T-account for a hypothetical bank, First Street Bank, which is the repository of $1 million in bank deposits.

Figure 25.2 shows First Street's financial position. The loans First Street has made are on the left side because they're assets: they represent funds that those who have borrowed from the bank are expected to repay. The bank's only other assets, in this simplified example, are its reserves, which, as we've learned, can take the form either of cash in the bank's vault or deposits at the Federal Reserve. On the right side we show the bank's liabilities, which in this example consist entirely of deposits made by customers at First Street. These are liabilities because they represent funds that must ultimately be repaid to depositors. Notice, by the way, that in this example First Street's assets are larger than its liabilities. That's the way it's supposed to be! In fact, as we'll see shortly, banks are required by law to maintain assets larger by a specific percentage than their liabilities.

In this example, First Street Bank holds reserves equal to 10% of its customers' bank deposits. The fraction of bank deposits that a bank holds as reserves is its **reserve ratio.**

In the modern American system, the Federal Reserve—which, among other things, regulates banks operating in the United States—sets a **required reserve ratio,** which is the smallest fraction of bank deposits that a bank must hold. To understand why banks are regulated, let's consider a problem banks can face: *bank runs.*

figure 25.2

Assets and Liabilities of First Street Bank

First Street Bank's assets consist of $1,000,000 in loans and $100,000 in reserves. Its liabilities consist of $1,000,000 in deposits—money owed to people who have placed funds in First Street's hands.

Assets		Liabilities	
Loans	$1,000,000	Deposits	$1,000,000
Reserves	$100,000		

The Problem of Bank Runs

A bank can lend out most of the funds deposited in its care because in normal times only a small fraction of its depositors want to withdraw their funds on any given day. But what would happen if, for some reason, all or at least a large fraction of its depositors *did* try to withdraw their funds during a short period of time, such as a couple of days?

The answer is that if a significant share of its depositors demanded their money back at the same time, the bank wouldn't be able to raise enough cash to meet those demands. The reason is that banks convert most of their depositors' funds into loans made to borrowers; that's how banks earn revenue—by charging interest on loans. Bank loans, however, are illiquid: they can't easily be converted into cash on short notice. To see why, imagine that First Street Bank has lent $100,000 to Drive-a-Peach Used Cars, a local dealership. To raise cash to meet demands for withdrawals, First Street can sell its loan to Drive-a-Peach to someone else—another bank or an individual investor. But if First Street tries to sell the loan quickly, potential buyers will be wary: they will suspect that First Street wants to sell the loan because there is something wrong and the loan might not be repaid. As a result, First Street Bank can sell the loan quickly only by offering it for sale at a deep discount—say, a discount of 50%, or $50,000.

The upshot is that if a significant number of First Street's depositors suddenly decided to withdraw their funds, the bank's efforts to raise the necessary cash quickly would force it to sell off its assets very cheaply. Inevitably, this leads to a *bank failure*: the bank would be unable to pay off its depositors in full.

What might start this whole process? That is, what might lead First Street's depositors to rush to pull their money out? A plausible answer is a spreading rumor that the bank is in financial trouble. Even if depositors aren't sure the rumor is true, they are likely to play it safe and get their money out while they still can. And it gets worse: a depositor who simply thinks that *other* depositors are going to panic and try to get

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It's a Wonderful Banking System

Next Christmastime, it's a sure thing that at least one TV channel will show the 1946 film *It's a Wonderful Life,* featuring Jimmy Stewart as George Bailey, a small-town banker whose life is saved by an angel. The movie's climactic scene is a run on Bailey's bank, as fearful depositors rush to take their funds out.

When the movie was made, such scenes were still fresh in Americans' memories. There was a wave of bank runs in late 1930, a second wave in the spring of 1931, and a third wave in early 1933. By the end, more than a third of the nation's banks had failed. To bring the panic to an end, on March 6, 1933, the newly inaugurated president, Franklin Delano Roosevelt, closed all banks for a week to give bank regulators time to shut down unhealthy banks and certify healthy ones.

Gabriel Bouys/AFP/Getty Images

In July 2008, panicky IndyMac depositors lined up to pull their money out of the troubled California bank.

Since then, regulation has protected the United States and other wealthy countries against most bank runs. In fact, the scene in *It's a Wonderful Life* was already out of date when the movie was made. But the last decade has seen several waves of bank runs in developing countries. For example, bank runs played a role in an economic crisis that swept Southeast Asia in 1997–1998 and in the severe economic crisis in Argentina, which began in late 2001.

Notice that we said "most bank runs." There are some limits on deposit insurance; in particular, currently only the first $250,000 of any bank account is insured. As a result, there can still be a rush to pull money out of a bank perceived as troubled. In fact, that's exactly what happened to IndyMac, a Pasadena-based lender that had made a large number of questionable home loans, in July 2008. As questions about IndyMac's financial soundness were raised, depositors began pulling out funds, forcing federal regulators to step in and close the bank. Unlike in the bank runs of the 1930s, however, most depositors got all their funds back—and the panic at IndyMac did not spread to other institutions.

A **bank run** is a phenomenon in which many of a bank's depositors try to withdraw their funds due to fears of a bank failure.

Deposit insurance guarantees that a bank's depositors will be paid even if the bank can't come up with the funds, up to a maximum amount per account.

Reserve requirements are rules set by the Federal Reserve that determine the required reserve ratio for banks.

The **discount window** is an arrangement in which the Federal Reserve stands ready to lend money to banks.

their money out will realize that this could "break the bank." So he or she joins the rush. In other words, fear about a bank's financial condition can be a self-fulfilling prophecy: depositors who believe that other depositors will rush to the exit will rush to the exit themselves.

A **bank run** is a phenomenon in which many of a bank's depositors try to withdraw their funds due to fears of a bank failure. Moreover, bank runs aren't bad only for the bank in question and its depositors. Historically, they have often proved contagious, with a run on one bank leading to a loss of faith in other banks, causing additional bank runs. The FYI "It's a Wonderful Banking System" describes an actual case of just such a contagion, the wave of bank runs that swept across the United States in the early 1930s. In response to that experience and similar experiences in other countries, the United States and most other modern governments have established a system of bank regulations that protects depositors and prevents most bank runs.

Bank Regulation

Should you worry about losing money in the United States due to a bank run? No. After the banking crises of the 1930s, the United States and most other countries put into place a system designed to protect depositors and the economy as a whole against bank runs. This system has three main features: *deposit insurance, capital requirements,* and *reserve requirements.* In addition, banks have access to the *discount window,* a source of loans from the Federal Reserve when they're needed.

Deposit Insurance Almost all banks in the United States advertise themselves as a "member of the FDIC"—the Federal Deposit Insurance Corporation. The FDIC provides **deposit insurance,** a guarantee that depositors will be paid even if the bank can't come up with the funds, up to a maximum amount per account. Currently, the FDIC guarantees the first $250,000 of each account. This amount will be subject to change in 2014.

It's important to realize that deposit insurance doesn't just protect depositors if a bank actually fails. The insurance also eliminates the main reason for bank runs: since depositors know their funds are safe even if a bank fails, they have no incentive to rush to pull them out because of a rumor that the bank is in trouble.

Capital Requirements Deposit insurance, although it protects the banking system against bank runs, creates a well-known incentive problem. Because depositors are protected from loss, they have no incentive to monitor their bank's financial health, allowing risky behavior by the bank to go undetected. At the same time, the owners of banks have an incentive to engage in overly risky investment behavior, such as making questionable loans at high interest rates. That's because if all goes well, the owners profit; and if things go badly, the government covers the losses through federal deposit insurance.

To reduce the incentive for excessive risk-taking, regulators require that the owners of banks hold substantially more assets than the value of bank deposits. That way, the bank will still have assets larger than its deposits even if some of its loans go bad, and losses will accrue against the bank owners' assets, not the government. The excess of a bank's assets over its bank deposits and other liabilities is called the *bank's capital.* For example, First State Street Bank has capital of $100,000, equal to 9% of the total value of its assets. In practice, banks' capital is required to equal at least 7% of the value of their assets.

Reserve Requirements Another regulation used to reduce the risk of bank runs is **reserve requirements,** rules set by the Federal Reserve that establish the required reserve ratio for banks. For example, in the United States, the required reserve ratio for checkable bank deposits is 10%.

The Discount Window One final protection against bank runs is the fact that the Federal Reserve, which we'll discuss more thoroughly later, stands ready to lend money to banks, an arrangement known as the **discount window.** The ability to borrow money means a bank can avoid being forced to sell its assets at fire-sale prices in order to satisfy the demands of a sudden rush of depositors demanding cash. Instead, it can turn to the Federal Reserve and borrow the funds it needs to pay off depositors.

Determining the Money Supply

Without banks, there would be no checkable deposits, and so the quantity of currency in circulation would equal the money supply. In that case, the money supply would be determined solely by whoever controls government minting and printing presses. But banks do exist, and through their creation of checkable bank deposits, they affect the money supply in two ways. First, banks remove some currency from circulation: dollar bills that are sitting in bank vaults, as opposed to sitting in people's wallets, aren't part of the money supply. Second, and much more importantly, banks create money by accepting deposits and making loans—that is, they make the money supply larger than just the value of currency in circulation. Our next topic is how banks create money and what determines the amount of money they create.

How Banks Create Money

Jonathan Kitchen/Photographer's Choice RF/Getty Images

To see how banks create money, let's examine what happens when someone decides to deposit currency in a bank. Consider the example of Silas, a miser, who keeps a shoebox full of cash under his bed. Suppose Silas realizes that it would be safer, as well as more convenient, to deposit that cash in the bank and to use his debit card when shopping. Assume that he deposits $1,000 into a checkable account at First Street Bank. What effect will Silas's actions have on the money supply?

Panel (a) of Figure 25.3 shows the initial effect of his deposit. First Street Bank credits Silas with $1,000 in his account, so the economy's checkable bank deposits rise by $1,000. Meanwhile, Silas's cash goes into the vault, raising First Street's reserves by $1,000 as well.

This initial transaction has no effect on the money supply. Currency in circulation, part of the money supply, falls by $1,000; checkable bank deposits, also part of the money supply, rise by the same amount.

figure 25.3 Effect on the Money Supply of Turning Cash into a Checkable Deposit at First Street Bank

(a) Initial Effect Before Bank Makes a New Loan

Assets		Liabilities	
Loans	No change	Checkable deposits	+$1,000
Reserves	+$1,000		

(b) Effect When Bank Makes a New Loan

Assets		Liabilities
Loans	+$900	No change
Reserves	−$900	

When Silas deposits $1,000 (which had been stashed under his bed) into a checkable bank account, there is initially no effect on the money supply: currency in circulation falls by $1,000, but checkable bank deposits rise by $1,000. The corresponding entries on the bank's T-account, depicted in panel (a), show deposits initially rising by $1,000 and the bank's reserves initially rising by $1,000. In the second stage, depicted in panel (b), the bank holds 10% of Silas's deposit ($100) as reserves and lends out the rest ($900) to Mary. As a result, its reserves fall by $900 and its loans increase by $900. Its liabilities, including Silas's $1,000 deposit, are unchanged. The money supply, the sum of checkable bank deposits and currency in circulation, has now increased by $900—the $900 now held by Mary.

But this is not the end of the story because First Street Bank can now lend out part of Silas's deposit. Assume that it holds 10% of Silas's deposit—$100—in reserves and lends the rest out in cash to Silas's neighbor, Mary. The effect of this second stage is shown in panel (b). First Street's deposits remain unchanged, and so does the value of its assets. But the composition of its assets changes: by making the loan, it reduces its reserves by $900, so that they are only $100 larger than they were before Silas made his deposit. In the place of the $900 reduction in reserves, the bank has acquired an IOU, its $900 cash loan to Mary. So by putting $900 of Silas's cash back into circulation by lending it to Mary, First Street Bank has, in fact, increased the money supply. That is, the sum of currency in circulation and checkable bank deposits has risen by $900 compared to what it had been when Silas's cash was still under his bed. Although Silas is still the owner of $1,000, now in the form of a checkable deposit, Mary has the use of $900 in cash from her borrowings.

And this may not be the end of the story. Suppose that Mary uses her cash to buy a television and a DVD player from Acme Merchandise. What does Anne Acme, the store's owner, do with the cash? If she holds on to it, the money supply doesn't increase any further. But suppose she deposits the $900 into a checkable bank deposit—say, at Second Street Bank. Second Street Bank, in turn, will keep only part of that deposit in reserves, lending out the rest, creating still more money.

Assume that Second Street Bank, like First Street Bank, keeps 10% of any bank deposit in reserves and lends out the rest. Then it will keep $90 in reserves and lend out $810 of Anne's deposit to another borrower, further increasing the money supply.

Table 25.1 shows the process of money creation we have described so far. At first the money supply consists only of Silas's $1,000. After he deposits the cash into a checkable bank deposit and the bank makes a loan, the money supply rises to $1,900. After the second deposit and the second loan, the money supply rises to $2,710. And the process will, of course, continue from there. (Although we have considered the case in which Silas places his cash in a checkable bank deposit, the results would be the same if he put it into any type of near-money.)

table 25.1

How Banks Create Money

	Currency in circulation	Checkable bank deposits	Money supply
First stage: Silas keeps his cash under his bed.	$1,000	$0	$1,000
Second stage: Silas deposits cash in First Street Bank, which lends out $900 to Mary, who then pays it to Anne Acme.	900	1,000	1,900
Third stage: Anne Acme deposits $900 in Second Street Bank, which lends out $810 to another borrower.	810	1,900	2,710

This process of money creation may sound familiar. Recall the *multiplier process* that we described in Module 16: an initial increase in real GDP leads to a rise in consumer spending, which leads to a further rise in real GDP, which leads to a further rise in consumer spending, and so on. What we have here is another kind of multiplier—the *money multiplier.* Next, we'll learn what determines the size of this multiplier.

Reserves, Bank Deposits, and the Money Multiplier

In tracing out the effect of Silas's deposit in Table 25.1, we assumed that the funds a bank lends out always end up being deposited either in the same bank or in another bank—so funds disbursed as loans come back to the banking system, even if not to the lending bank itself. In reality, some of these loaned funds may be held by borrowers in their wallets and not deposited in a bank, meaning that some of the loaned amount "leaks" out of the banking system. Such leaks reduce the size of the money multiplier, just as leaks of real income into savings reduce the size of the real GDP multiplier. (Bear in mind, however, that the "leak" here comes from the fact that borrowers keep some of their funds in currency, rather than the fact that consumers save some of their income.) But let's set that complication aside for a moment and consider how the money supply is determined in a "checkable-deposits-only" monetary system, in which funds are always deposited in bank accounts and none are held in wallets as currency. That is, in our checkable-deposits-only monetary system, any and all funds borrowed from a bank are immediately deposited into a checkable bank account. We'll assume that banks are required to satisfy a minimum reserve ratio of 10% and that every bank lends out all of its **excess reserves,** reserves over and above the amount needed to satisfy the minimum reserve ratio.

Excess reserves are a bank's reserves over and above its required reserves.

The **monetary base** is the sum of currency in circulation and bank reserves.

Now suppose that for some reason a bank suddenly finds itself with $1,000 in excess reserves. What happens? The answer is that the bank will lend out that $1,000, which will end up as a checkable bank deposit somewhere in the banking system, launching a money multiplier process very similar to the process shown in Table 25.1. In the first stage, the bank lends out its excess reserves of $1,000, which becomes a checkable bank deposit somewhere. The bank that receives the $1,000 deposit keeps 10%, or $100, as reserves and lends out the remaining 90%, or $900, which again becomes a checkable bank deposit somewhere. The bank receiving this $900 deposit again keeps 10%, which is $90, as reserves and lends out the remaining $810. The bank receiving this $810 keeps $81 in reserves and lends out the remaining $729, and so on. As a result of this process, the total increase in checkable bank deposits is equal to a sum that looks like:

$$\$1{,}000 + \$900 + \$810 + \$729 + \ldots$$

We'll use the symbol rr for the reserve ratio. More generally, the total increase in checkable bank deposits that is generated when a bank lends out $1,000 in excess reserves is the:

(25-1) Increase in checkable bank deposits from $1,000 in excess reserves =
$$\$1{,}000 + \$1{,}000 \times (1 - rr) + \$1{,}000 \times (1 - rr)^2 + \$1{,}000 \times (1 - rr)^3 + \ldots$$

As we have seen, an infinite series of this form can be simplified to:

(25-2) Increase in checkable bank deposits from $1,000 in excess reserves =
$$\$1{,}000/rr$$

Given a reserve ratio of 10%, or 0.1, a $1,000 increase in excess reserves will increase the total value of checkable bank deposits by $1,000/0.1 = $10,000. In fact, in a checkable-deposits-only monetary system, the total value of checkable bank deposits will be equal to the value of bank reserves divided by the reserve ratio. Or to put it a different way, if the reserve ratio is 10%, each $1 of reserves held by a bank supports $\$1/rr = \$1/0.1 = \$10$ of checkable bank deposits.

The Money Multiplier in Reality

In reality, the determination of the money supply is more complicated than our simple model suggests because it depends not only on the ratio of reserves to bank deposits but also on the fraction of the money supply that individuals choose to hold in the form of currency. In fact, we already saw this in our example of Silas depositing the cash under his bed: when he chose to hold a checkable bank deposit instead of currency, he set in motion an increase in the money supply.

To define the money multiplier in practice, we need to understand that the Federal Reserve controls the **monetary base,** the sum of currency in circulation and the

reserves held by banks. The Federal Reserve does not determine how that sum is allocated between bank reserves and currency in circulation. Consider Silas and his deposit one more time: by taking the cash from under his bed and depositing it in a bank, he reduces the quantity of currency in circulation but increased bank reserves by an equal amount. So while the allocation of the monetary base changes—the amount in reserves grows and the amount in circulation shrinks—the total of these two, the monetary base, remains unchanged.

The monetary base is different from the money supply in two ways. First, bank reserves, which are part of the monetary base, aren't considered part of the money supply. A $1 bill in someone's wallet is considered money because it's available for an individual to spend, but a $1 bill held as bank reserves in a bank vault or deposited at the Federal Reserve isn't considered part of the money supply because it's not available for spending. Second, checkable bank deposits, which are part of the money supply because they are available for spending, aren't part of the monetary base.

Figure 25.4 shows the two concepts schematically. The circle on the left represents the monetary base, consisting of bank reserves plus currency in circulation. The circle on the right represents the money supply, consisting mainly of currency in circulation plus checkable or near-checkable bank deposits. As the figure indicates, currency in circulation is part of both the monetary base and the money supply. But bank reserves aren't part of the money supply, and checkable or near-checkable bank deposits aren't part of the monetary base. In normal times, most of the monetary base actually consists of currency in circulation, which also makes up about half of the money supply.

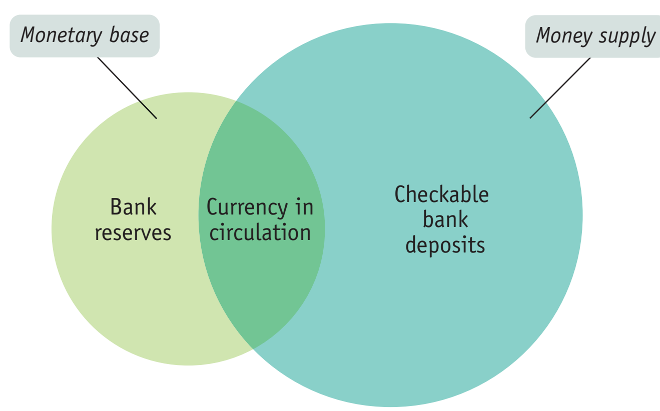
Now we can formally define the **money multiplier:** it's the ratio of the money supply to the monetary base. Most importantly, this tells us the total number of dollars created in the banking system by each $1 addition to the monetary base. In a simple situation in which banks hold no excess reserves and all cash is deposited in banks, the money multiplier is $1/rr$. So if the reserve requirement is 0.1 (the minimum required ratio for most checkable deposits in the United States), the money multiplier is $1/0.1 = 10$, and if the Federal Reserve adds $100 to the monetary base, the money supply will increase by $10 \times \$100 = \$1{,}000$. During normal times, the actual money multiplier in the United States, using M1 as our measure of money, is about 1.9. That's a lot smaller than 10. Normally, the reason the actual money multiplier is so small arises from the fact that people hold significant amounts of cash, and a dollar of currency in circulation, unlike a dollar in reserves, doesn't support multiple dollars of the money supply. In fact, currency in circulation normally accounts for more than 90% of the monetary base. But as this book went to press in early 2010, the money multiplier was even smaller, about 0.8. What was going on?

The **money multiplier** is the ratio of the money supply to the monetary base. It indicates the total number of dollars created in the banking system by each $1 addition to the monetary base.

figure 25.4

The Monetary Base and the Money Supply

The monetary base is equal to bank reserves plus currency in circulation. It is different from the money supply, consisting mainly of checkable or near-checkable bank deposits plus currency in circulation. Each dollar of bank reserves backs several dollars of bank deposits, making the money supply larger than the monetary base.



The answer is that early 2010 was not a normal time: Starting in late 2008, legislation intended to stabilize the troubled U.S. economy made it much more attractive for banks to hold excess reserves. And banks responded by increasing their reserves tremendously, from $10 billion in 2008 to $1.2 trillion by January of 2010. And those large excess reserves—funds not lent out to potential borrowers—increased the monetary base without increasing the money supply. It was as if that money had "leaked" out of the money multiplier process and into excess reserves held by banks, reducing the size of the money multiplier.

Module 25 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Suppose you are a depositor at First Street Bank. You hear a rumor that the bank has suffered serious losses on its loans. Every depositor knows that the rumor isn't true, but each thinks that most other depositors believe the rumor. Why, in the absence of deposit insurance, could this lead to a bank run? How does deposit insurance change the situation?
2. A con artist has a great idea: he'll open a bank without investing any capital and lend all the deposits at high interest rates to real estate developers. If the real estate market booms, the loans will be repaid and he'll make high profits. If the real estate market goes bust, the loans won't be repaid and the bank will fail—but he will not lose any of his own wealth. How would modern bank regulation frustrate his scheme?
3. Assume that total reserves are equal to $200 and total checkable bank deposits are equal to $1,000. Also assume that the public does not hold any currency and banks hold no excess reserves. Now suppose that the required reserve ratio falls from 20% to 10%. Trace out how this leads to an expansion in bank deposits.
4. Take the example of Silas depositing his $1,000 in cash into First Street Bank and assume that the required reserve ratio is 10%. But now assume that each recipient of a bank loan keeps half the loan in cash and deposits the rest. Trace out the resulting expansion in the money supply through at least three rounds of deposits.

Tackle the Test: Multiple-Choice Questions

1. Bank reserves include which of the following?
   I. currency in bank vaults
   II. bank deposits held in accounts at the Federal Reserve
   III. customer deposits in bank checking accounts
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. The fraction of bank deposits actually held as reserves is the
   a. reserve ratio.
   b. required reserve ratio.
   c. excess reserve ratio.
   d. reserve requirement.
   e. monetary base.
3. Bank regulation includes which of the following?
   I. deposit insurance
   II. capital requirements
   III. reserve requirements
   a. I only
   b. II only
   c. III only
   d. I and II
   e. I, II, and III
4. Which of the following changes would be the most likely to reduce the size of the money multiplier?
   a. a decrease in the required reserve ratio
   b. a decrease in excess reserves
   c. an increase in cash holding by consumers
   d. a decrease in bank runs
   e. an increase in deposit insurance
5. The monetary base equals
   a. currency in circulation.
   b. reserves held by banks.
   c. currency in circulation − reserves held by banks.
   d. currency in circulation + reserves held by banks.
   e. currency in circulation/reserves held by banks.

Tackle the Test: Free-Response Questions

1. How will each of the following affect the money supply through the money multiplier process? Explain.
   a. People hold more cash.
   b. Banks hold more excess reserves.
   c. The Fed increases the required reserve ratio.

Answer (6 points)

1 point: It will decrease.

1 point: Money held as cash does not support multiple dollars in the money supply.

1 point: It will decrease.

1 point: Excess reserves are not loaned out and therefore do not expand the money supply.

1 point: It will decrease.

1 point: Banks will have to hold more as reserves and therefore loan out less.

2. The required reserve ratio is 5%.
   a. If a bank has deposits of $100,000 and holds $10,000 as reserves, how much are its excess reserves? Explain.
   b. If a bank holds no excess reserves and it receives a new deposit of $1,000, how much of that $1,000 can the bank lend out and how much is the bank required to add to its reserves? Explain.
   c. By how much can an increase in excess reserves of $2,000 change the money supply in a checkable-deposits-only system? Explain.