Before we turn our attention to monetary policy it is important to have a basic understanding of fractional reserve banking and monetary institutions. The two are closely connected. The nature of fractional reserve banking played a fundamental role in the evolution of the Federal Reserve System, the principal monetary institution in the United States. In particular, the Federal Reserve System, or the Fed as it has come to be known, was established to overcome some of the difficulties associated with a fractional reserve banking system.

**Fractional Reserve Banking**

To begin our discussion we recount a simple story about the origin of fractional reserve banking. The story is apocryphal, but it serves to illustrate the nature of fractional reserve banking; and to set the stage for a discussion of bank panics.

Think of a river town surrounded by many farms. The farmers come into town to buy goods, and to sell their crops for transport down river. On the way home the farmers are often robbed by bandits, and months of hard work can disappear in moments. The farmers are too poor to hire guards, and so accept the trials of the trail as a part of life.

An idea dawns on a trusted merchant in town. Farmers don't need to take their money home. Instead, they can leave their money with the merchant, call her Ms. Rothschilds. When they need to buy goods from the general store, or some other store in town, they can just write down on a piece of paper how much money Ms. Rothschilds should give to the store owner, and sign it. When the store owner presents the piece of paper, she decides to call it a check, Ms. Rothschilds hands over cash, and subtracts that amount from the farmer's account. The fruits of the farmer's labor can no longer be picked by the bandits.

Consider how this setup will work in its first week. Farmers deposit $5000 on opening day, and Ms. Rothschilds hosts a big celebration so that no checks are written on Monday. The
$5000 of deposits are recorded in Table 19.1. On Tuesday business begins. Checks worth $600 are presented at the Rothschilds' for payment, but $350 of new deposits are received. At the end of the day Table 19.1 shows $4750 in total deposits. On Wednesday $400 of withdrawals are made, but there are also $750 of new deposits. Total deposits at the end of business on Wednesday are $5100. On Thursday farmers make new deposits of $500, withdrawals are $650, so total deposits end at $4950. Finally, on Friday new deposits are $550, while withdrawals are $500, so at the end of the week total deposits return to $5000.

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<thead>
<tr>
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<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>new deposits</td>
<td>$5000</td>
<td>$350</td>
<td>$750</td>
<td>$500</td>
<td>$550</td>
</tr>
<tr>
<td>withdrawals</td>
<td>-</td>
<td>$600</td>
<td>$400</td>
<td>$650</td>
<td>$500</td>
</tr>
<tr>
<td>total deposits</td>
<td>$5000</td>
<td>$4750</td>
<td>$5100</td>
<td>$4950</td>
<td>$5000</td>
</tr>
<tr>
<td>cash in vault</td>
<td>$5000</td>
<td>$4750</td>
<td>$5100</td>
<td>$4950</td>
<td>$5000</td>
</tr>
</tbody>
</table>

On Friday night Ms. Rothschilds studies the above table, and notices something remarkable. On any given day withdrawals are about offset by new deposits. The offset is not exact, but it is close; especially relative to the level of deposits. This means that the level of total deposits stays right around $5000. Immediately she sees an opportunity for profit. She could make a loan of some of the $5000, say $3000, and still safely meet the withdrawal demands of her customers. The loan would yield her interest income.

Suppose the second week goes just like the first except a five-day $3000 loan is made on Monday morning, and repaid at the end of business on Friday. Table 19.2 charts the path of the various balances. During the week our banker is able to meet all the withdrawal demands, with a cushion of nearly $2000 each day to boot. At the end of the week she has the same vault cash as she did at the end of the first week, but now she has some interest income she didn't have before.

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<th>Monday</th>
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</thead>
</table>

Table 19.2
Monday through Thursday Ms. Rothschilds does not have all of the deposits on hand because some of the funds are out in the loan. She holds only a fraction of the deposits on hand as reserves in her vault. For example, on Wednesday she holds about 41% of the $5100 in deposits in reserves as vault cash (2100/5100 = .412). We say that Ms. Rothschilds is engaging in fractional reserve banking.

It seems as though fractional reserve banking makes everyone better off. The farmers no longer fall prey to bandits, the banker earns some additional income, and someone receives a loan who would otherwise go without one. Indeed, everyone is better off so long as nothing, or at least not very much, goes wrong. If the loans are almost all good, and all the depositors don't come calling for their money at the same time, all remains well. However, if a host of loans go bad, the bank will not have sufficient assets, loans plus reserves, to pay off its depositors. A bank in this situation is called insolvent, or bankrupt, and goes out of business. The depositors will lose some or all of their funds.

The system also breaks down if the depositors arrive en masse to make withdrawals. For example, if on Wednesday all of Ms. Rothschilds' depositors arrive to take out their deposits, she will be unable to meet their demands. The vault has only $2100 in it, so she will be $3000 short. Such a sudden demand for withdrawals is called a bank run or bank panic. A bank that cannot meet a sudden surge of withdrawal demands is called illiquid, and must suspend its business.

**Bank Panics in the United States**

Between the Civil War and the first decade of the twentieth century there were six major banking panics in the U.S., and each panic was associated with a recession. The panics may have contributed to the onset of recession, or greatly aggravated recessions that would have occurred anyway. In any case, observers at the time recognized panics as a major problem.
A banking panic is sometimes called a contagion because a run on one bank tends to lead to a run on another. To see how this can happen, suppose that you find out your bank has made several bad loans. You are right to wonder if these defaults make your bank insolvent, and so threaten your deposits. As a prudent depositor you may very well decide to withdraw your deposits—better safe than sorry. So off you go to your bank. Other depositors think along the same lines that you do, and a run on your bank commences.

My deposits are in another bank that, so far as I know, has no bad loans. However, it may have held deposits with the failed bank, and the loss of those funds may threaten my bank. Moreover, even though I am levelheaded and calm, my neighbor down the road, who shares my bank, is not so levelheaded. I may fear that he, and others like him, will run on my bank even if it is solvent. To avoid disaster I decide to take my deposits out of my solvent bank. My neighbor thinks the same thing about me as I do him, so he too hurries to take out his deposits. In this way a run on an insolvent bank spreads to solvent ones.

The panic of 1907 serves as a good illustration. A man named F. A. Heinze had made a fortune in Montana speculating on copper. To the dismay of the New York banking establishment, he used a portion of his wealth to buy a controlling interest in the Merchantile bank of New York City. It was thought that Mr. Heinze used the assets of the bank to further his interest in copper, and when the price of copper fell precipitously in October of 1907, depositors lost trust in the Merchantile. A run commenced.

Other banks stepped in to support the Merchantile on the condition that Heinze resign, which he did. The episode would have ended there except another man of dubious character, Mr. C. F. Morse, who was a director of the Merchantile, also owned controlling interest in several medium-sized New York City banks. The depositors at his other banks began to remove their deposits in haste, even though there was no suggestion that the Morses’ banks were insolvent. Again, large banks stepped in to calm the panic, but the calm was only temporary. The president of the Knickerbocker Trust Company happened to be associated with Mr. Morse in some of his enterprises. This connection made depositors of the Trust nervous, and another run began. The unfortunate chain continued as the president of the Knickerbocker also sat on the board of directors of The Trust Company of America, and, worse yet, news that the affairs of this
Trust were the subject of an investigation leaked; and the panic spread further. The troubles in New York City soon spread to the rest of the nation. O. M. W. Sprague described it:

"Everywhere the banks suddenly found themselves confronted with demands for money by frightened depositors; everywhere, also, banks manifested a lack of confidence in each other. Country banks drew money from city banks and all the banks throughout the country demanded the return of funds deposited or on loan in New York."

Panics eventually end when banks suspend payments. Banks simply close their doors, or severely limit the amounts that can be withdrawn. In 1907 the suspension of payments lasted two full months and this suspension was only a moderate one. It is not difficult to imagine the hardship such a suspension causes. Firms may not be able to meet their payrolls. Workers who are not paid cannot pay their bills and mortgages. Businesses and households will find it hard to take out a loan. In short, a bank panic shuts down, or severely disables the payments mechanism of the country. That banking panics were associated with economic hardships should come as no surprise.

The Formation of the Fed

After the panic of 1907 Congress formed the National Monetary Commission to study the causes of panics and suggest possible cures for them. The book by Sprague quoted earlier was a product of this commission.

The Commission concluded that a bank panic, or the fear of one, produces a sudden, and large increase in the demand for currency. Depositors want to trade their deposits for cash. Banks want to meet this increase in the demand for currency, and so want to trade their loans and bonds for cash. However, there was no way for the supply of cash to increase to satisfy the sudden surge in demand. The system broke down, and payments were suspended when the irresistible force of the demand surge met the immovable supply of currency. The Commission

See Sprague *History of Crisis Under the National Banking System*. Originally published in 1910, it was reprinted in 1977 by Augustus M. Kelley Publishers, Fairfield, New Jersey. The details of the above story are also from Sprague who discusses each of the panics in the post Civil War period.
summed up this state of affairs by saying that the supply of money was inelastic. It was unable to expand to accommodate sudden increases in demand.

The eventual solution to the problem of an inelastic supply of money brought the Federal Reserve System into existence. The Federal Reserve Act of 1913 created twelve regional Federal Reserve banks distributed throughout the country. When the Fed was founded the regional banks exercised much of the power in the system. However, today the power primarily rests in the hands of the seven-member Board of Governors located in Washington D.C. The governors of the Fed are appointed by the president and confirmed by the Senate. The chairman of the Board of Governors serves a four-year term, while the other governors serve fourteen years. The appointments are staggered so that one appointment must be made every two years. The fourteen year terms of the governors afford them a significant degree of political independence.

To address the problem of banking panics the Fed was given the following powers:

1) the power to issue currency
2) the power to make loans to banks

The currency you carry around today carries the label "Federal Reserve Note." The power to issue new notes gives the Fed the ability to change the money supply. The Fed is also the so-called banker's bank. Banks may take out loans from the Fed, and banks may hold deposits there. Today these deposits count as reserves just like vault cash. The interest rate that the Fed charges banks when they take out a loan is called the discount rate. The lending role of the Fed provides a mechanism to get increases in the money supply into circulation.33

Suppose a bank panic has just begun, or is about to begin. Banks need to rapidly increase their holdings of currency. They can do this by borrowing from the Fed. Banks come to the Fed, and take out loans. The Fed makes the new loans by issuing new currency, and the money supply increases. When depositors come for their deposits, banks will be amply supplied with cash; and will be able to honor withdrawal demands. People act in a funny way during a bank panic.

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33 Banks become members of the Fed by buying stock in the system. The stock entitles the bank to participate in the choice of directors of the regional Fed, and to enjoy access to various services, such as check clearing, that the Fed provides. A member also agrees to supervision and regulation by the Fed. Almost all the large banks in the US. became members of the Federal Reserve System when it was formed.
panic. They rush down to take their deposits out the bank, but, as soon as they know they can get their money out of the bank, they just as quickly want to put it back. When the deposits return, banks can repay the loans from the Fed. In this way the Fed was supposed to stop bank panics.

Before we leave the Federal Reserve Act we should mention some of its other provisions. The Fed was to hold a stock of government bonds. The interest income from the bonds finances the work of the Fed. This gives the Fed a source of income independent of the federal budget, and reduces the influence of politics on Fed behavior. If Congress is upset over some action of, say, the Federal Drug Administration, it can reduce the FDA's budget. This provides Congress with leverage over these agencies. To exert the same pressure on the Fed would require major legislation to reorganize central banking in the U.S., and so would be more difficult.

To manage the stock of government securities that it holds, the Fed buys and sells government bonds on the open market. These purchases and sales are called open market operations. Though originally seen as a way to finance the Fed, open market operations have become the main way in which the Fed changes the money supply. The Federal Open Market Committee (FOMC) determines the quantity and timing of open market purchases and sales. The Federal Reserve Bank of New York City actually carries out the buying and selling of government securities. The FOMC is made up of the seven governors, and five of the presidents of the regional Feds. The five presidents rotate on an annual basis with the exception of the president of the New York Fed who always sits on the FOMC. We will get to the details of how open market operations change the money supply later.

The Act also directed the Fed to serve several other functions. It was to act as the national clearing house for checks. So, today when a parent in Boston sends his or her child in Oxford a check, the check most likely makes its way back to Boston through the Federal Reserve System. The Fed also has a role in the supervision and regulation of banks, and, finally, it serves as the bank for the federal government.

Some Later Legislation

You may have noticed that the Fed failed in its basic mission. The most serious bank panics in the United States occurred in the early 1930s, well after the Fed was founded, and are
closely associated with the Great Depression. Controversy still surrounds the reasons for the Fed's failure, but, whatever the reason, its failure in the 1930s led to legislation that did end bank runs. The Banking Act of 1933 created the Federal Deposit Insurance Corporation (FDIC). Initially the FDIC insured deposits up to $2,500. Today, deposits are guaranteed by the FDIC up to $100,000. Depositors, at least those with deposits less than the ceiling, have no reason to make withdrawals on the news that their bank may fail. The FDIC will make the deposits good. As a result, the incentive to run on a bank has vanished.

The Banking Act of 1935 gave to the Fed the power to set reserve requirements for member banks. Initially the requirements were set at about 15%, so a bank that held $4,000,000 in deposits would be required by law to hold $600,000 in reserves. Currently, reserve requirements are tiered. For transactions balances, checkable deposits are the main item, the reserve requirement is 3% on the first $54 million of deposits, and 10% on deposits over that amount.

The next major piece of comprehensive reform would come some forty five years later. Over this period the distinction between banks, savings and loans, and other financial institutions blurred, and instead of banks we now refer to institutions that offer checkable accounts as depository institutions. Among other things, the Depository Institution Deregulation and Monetary Control Act of 1980 gave all depository institution access to the services of the Fed, and extended the Fed's power to set reserve requirements to all depository institutions.

Summary

In this chapter we have explained the rationale behind fractional reserve banking. Its invention was motivated by a profitable opportunity to lend idle reserves, but this lending leads to the risk of bank runs. The U.S. experienced many episodes of such runs, and these runs were associated with bad economic times. The Federal Reserve System was created to deal with bank panics. Even though the Fed failed in the 1930s to protect the economy from the savages of bank runs, it survived as an institution, and is today the bastion of monetary policy, a topic we now have the background to study.
Review Questions

1) How was the Fed supposed to end a banking panic?

2) Use the data below to find the fraction of reserve that this bank keeps on hand, and to fill in the blanks. How is this bank making a profit?

<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>new deposits</td>
<td>$10,000</td>
<td>$500</td>
<td>$1,100</td>
<td>$500</td>
<td>$</td>
</tr>
<tr>
<td>withdrawals</td>
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<td>$900</td>
<td>$500</td>
<td>$500</td>
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<tr>
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<td>$9,400</td>
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<td>$10,000</td>
<td>$700</td>
<td>$900</td>
<td>$10,000</td>
<td>$</td>
</tr>
</tbody>
</table>

3) What are the two ways that a bank may fail? What would cause the above bank to fail because of insolvency?

4) Review the 1907 panic. If the Fed had existed and you had been its chair, what action would you have taken to cut the panic short?

5) List all the powers the Fed has accumulated over time. Can you explain why the Fed was given these powers?