Macroeconomics: an Introduction

Chapter 6
Money, Banks and The Federal Reserve

****

Outline

Preview

Money is one of the essential elements of civilization, as fundamental as the wheel and the written word. It is also one of the most mysterious things we deal with. It is almost magical that a piece of paper can be exchanged for valuable goods. Why is money valuable? What makes

money money? Where does it come from? Who makes it? What do banks have to do with money?

In this chapter we will explore these and other questions. Putting money in an historical context, we will see what money has been, and what it is today. Along the way we will see how different forms of money evolved, how banks came about and what role they play in the monetary system, and how the modern central bank has become the ring leader of that system. And we look at why many major banks failed in 2008 and had to be merged with stronger banks.

6.1 What is Money?

Money is whatever is generally acceptable as payment to the seller of a good or service. If you visited a remote island in the Pacific and noticed that when people traded one person always received shells while the other sometimes received fish and sometimes coconuts or sunglasses, then you would know that shells serve as money in that economy. In a modern economy, money consists of coins, paper currency, and bank deposits that can be disbursed by check since those are what are accepted in payment for goods and services.

Money is so important to the functioning of an economy that economies without money are practically unknown. In situations where money doesn't exist, people invent it. For example, in prisoner-of-war camps in World War II, cigarettes came to be used as money. Why is money so important to every economy?

What Money Does for Us

Think for a minute of the consequences of not having money in the economy. How would your employer, say a computer manufacturer, pay you your wages? You could be paid in the computers that the firm produces, but you can probably only use one computer yourself, you can't eat computers, and your landlord has no use for them. You would have to go out and try to find someone who wants a computer and who also has something that you want, or something that you think you can trade for something you want.

This time-consuming process is called **barter**, the trading of one good or service for another. There is obviously a huge benefit to society in the elimination of barter by finding one thing that everyone is willing to take in trade for anything. That is why money ranks with the wheel as one of the great inventions of human history. Money serves as the **medium of exchange**, what you find on one side of every transaction. Money is the oil which lubricates the wheels of trade.

Money performs two other important services in the economy. It provides us with a **unit of account**, a yardstick, with which economic values can be measured and compared. In a barter economy one might trade three apples for an audio tape and an hour of labor for a compact

disk. However, that gives no indication of the cost of a tape compared to a CD unless we know how many apples you can get for an hour of labor. In a monetary economy it is simple to compare the price of an audio tape at $6.95 with that of a CD at $11.95. Since each of us has a sense of what a dollar will buy, a price quoted in dollars conveys information about the costliness of an item very efficiently. For example, you are shopping for your first business suit and the price tag reads $250. You can immediately put the cost of that suit on a scale that allows you to compare it with many other things you would like to buy, and to compare it with your income. If you are offered a salary of $36,000 per year to start, that single number gives you all the information you need, to know the standard of living you will have.

When we say that "you are making $60,000 a year," we are speaking of money as a unit of account. You will probably never actually hold $60,000 at one time if you receive your salary in bimonthly payments of $2,500. Your salary check in the amount of $2,500 is money as the medium of exchange. The amount of money that you hold today is the amount of currency you have plus the balance of your checking account; it is not your income. Money, as the medium of exchange, flows into your bank account as you receive salary payments, and it flows out as you make disbursements.

The amount of money you hold at any one point in time is what economists refer to as a "stock," and can be thought of as being like the amount of water in a storage tank. Income flows into the tank, adding to its level, and expenditures flow out, depleting it. The **stock of money** you hold at a point in time is money in the sense of medium of exchange, while the rates of the income and expenditure flows are measured in the unit of account. These two uses of money units are clearly closely related, but they are not the same.

Adding to the potential confusion, while money is itself an asset, it is also used as the unit of account for all assets. When we read in a magazine that Bill Gates, co-founder of Microsoft, is worth $50 billion, it does not mean that he holds $50 billion in the form of money, although one imagines that his money holdings are substantial! What it does mean is that if we add up the market values of his shares of Microsoft and other assets, including money, the sum would be $50 billion.

The fact that it is easy to confuse these different meanings of the word “money” certainly contributes to common misunderstandings about the role of money in the economy. For example, we often read or hear statements like "higher consumer spending added money to the economy this spring." In reality, spending transfers money from one wallet to another, but it does not add to the quantity of money in existence, the amount of coins, dollar bills, and checking accounts.

The third very important function of money in the economy is as a **store of value**, a temporary abode of purchasing power that can be called upon on short notice. For an asset to be a good store of value it

must be a **liquid asset**, one that can be converted into goods or services quickly at low cost and with low risk. A diamond ring is valuable but it is not very liquid because of the large spread between what an individual pays for it at a jewelry store and what one can sell it for, particularly on short notice. Similarly, a house is valuable but not liquid because its sale may take months. Shares in Microsoft Corp. are valuable and can be sold quickly at the market price with payment of only a small commission, but their market value fluctuates from day to day. All stocks and bonds are subject to risk from changes in their market value. A savings account is very liquid because the cost of using it is low and the value does not fluctuate from day to day. A $20 bill in your wallet is even more liquid than a savings account because you don't have to make a trip to the bank to use it to settle a transaction. The fact that money is the medium of exchange means that money is the most liquid of all assets, and that is what makes it ideal as a store of value.

What Makes a Good Money

The earliest kind of money in human history was **commodity money** which is made of some material that had value in other uses. Arrow heads, cattle, grain, and manufactured metal objects all served as money for primitive people. Early colonists in America used tobacco leaves that they grew and exported to England as a medium of exchange. In Massachusetts, the colonists adopted the monetary system of the native Americans, wampum made by stringing together beads made from shells.

What sorts of commodities would we expect to see used as money? Ones that are:

- **Durable.**
- **Valuable in small sizes and weights.**
- **Divisible.**
- **Easily verified as genuine.**
- **Stable in value.**

From earliest times, copper, silver, and gold were recognized as good materials to make money from. They all possess the characteristics listed above. They are durable because they do not rust, and they are stable in value because their quantity cannot change rapidly. Gold has long been considered the premier commodity money because it is the most valuable of the three metals and its almost uniquely high density make verification very easy; no other metal (outside of a chemistry lab) weighs as much in a given volume. The problem with using simple chunks or bars of metal as money is, of course, that one cannot be sure of the exact

volume or content. Thus, coins were invented to make metallic money more readily verifiable.

The Advent of Coins

Since ancient times, governments have stamped metals into standardized disks or other shapes with the value or weight of the coin embossed on it. This gave some protection against cheating and simplified trading by creating standard denominations. The first coins are thought to have been minted in the ancient Greek city of Lydia, in what is now Turkey, around 600 BC. These coins were called "staters," from which our word "standard" originates, and were made from a naturally occurring alloy of gold and silver. Traders soon spread these coins throughout the Greek world. The Romans began to mint coins about 200 BC. They stamped a flattering likeness of their ruler on the face of the coin, a practice which survives to this day. Coins containing a specific quantity of silver or gold were minted in the U.S. well into this century, with gold coins disappearing from use in the 1930's and silver coins in the 1960's.

The invention of minted coins made it harder for private individuals to cheat on the metallic content of money, although people did always manage to nick off small bits of a coin or rub off some of the metal. The temptation for government, however, to reduce the precious metal content of coins was ever present and during times of war it usually became irresistible. Why not stretch out the government's supply of gold and silver by alloying them with a bit more copper?

For a while, most people could not tell the new, cheaper coins from the old, allowing the sovereign to purchase a few more ships or swords than he could have otherwise. After a while, though, people did catch on to the fact that the new coins contained less precious metal and they would begin to hoard the old coins while trying to pass the less valuable new coins on to others in trade. Based on such episodes, Sir Thomas Gresham (1558) observed that bad money drives good money out of circulation, a principle that has become known as Gresham's Law although it has been a recognized fact since antiquity. Over the several century history of the Roman Empire, the precious metal content of the Roman denarius diminished almost to the vanishing point.

Gresham's Law continues to operate in modern economies including ours. Prior to 1965, U.S. coins contained silver in an amount that was worth somewhat less than the face value of the coin. However, as inflation pushed the market price of silver up along with other commodities in the 1960s, the silver in a coin became worth more than the face value. At that point it cost the U.S. Treasury more than $.25 to make a quarter and it became profitable to melt the coins down and sell the silver. In short, a dime or quarter was worth more dead than alive. To avoid having all coins disappear from circulation, Congress made it illegal to melt coins and silver was replaced in coins by the copper

sandwich we have today. Not surprisingly, the old silver coins disappeared from circulation very rapidly as people sifted through their pocket change and set aside the silver coins. No one would settle a transaction with a silver quarter worth, say, $.50 as metal when they could use a new sandwich quarter instead. Today, the pre-1965 silver dimes and quarters still trade as commodities for about three or four times face value, depending on the current price of silver. While it is now legal to melt them down, these coins, as coins always do, serve to provide an easily verified quantity of silver for those who wish to hold it.

Fiat Money

Today, no country uses coins as a medium of exchange that have significant commodity value. The coins in use today are called token coins which have value only because they are **legal tender**, meaning that the law requires that they be accepted as payment. Paper money is, of course, worth almost nothing as a commodity, but it has value because of the phrase "THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE" which is printed next to the picture of a President. Money which has value only because it is legal tender is called **fiat money**. Each of us accepts fiat money in payment because we know that the next person will accept it from us, and indeed even are required to, by law. Paper money and coins are referred to collectively as currency.

Paper money was in use in China by the time of Marco Polo's visit in the late 1200s, but did not come into use in Europe until the 1600s. Until very recently, paper money was generally a claim on a certain quantity of precious metal held either by a government or by a private bank. As long as people believed that they could redeem their paper money, or notes, for the promised quantity of silver or gold, the notes would be accepted in commerce at their stated value. Governments found that they could print additional notes and use them to pay bills.

The profit that a government makes by manufacturing money is called seigniorage, and it became an important source of revenue. The temptation, of course, was for governments to issue a quantity of notes far in excess of the metal backing them, particularly during times of war. When it became apparent to the public that the notes could no longer be redeemed for metal, the value of the notes would invariably plummet.

In our own history, the early colonies printed their own paper currencies which often lost much of their value when the finances of the colonial government became shaky. During the American Revolution, the Continental Congress issued paper notes called "continentals" which were to be redeemable in a Spanish silver coin called a "dollar." When the costs of the war against King George mounted beyond expectations, as the cost of war always does, the decline in their value gave rise to the expression "not worth a continental." Again, during the Civil War, the printing press became a source of revenue when the U.S. Treasury issued "greenbacks," so called because of the green ink that was used.

Greenbacks could not be exchanged for coins and soon declined in value. The last links between paper money and metal in the U.S. were broken when the gold certificates were withdrawn from circulation in 1933 and, finally, when silver certificates were withdrawn in the 1960s. Our paper money today says "FEDERAL RESERVE NOTE" along the top. It is issued by the Federal Reserve, not the U.S. Treasury, and carries no promise of redemption in metal. It is a purely fiat money.

Bank Money and Near Money

When you pay a bill in today's economy you are less likely to use currency than you are to write a check. A check instructs the bank where you have your checking account to pay the stated amount to the person or firm you designate. The balance in your checking account is therefore a kind of money. Unlike currency, your check may not always be acceptable everywhere, but it is more secure from theft than currency. Checking accounts have traditionally been known as **demand deposits** because funds could be withdrawn on demand as distinguished from savings accounts, sometimes called **time deposits**, which technically could require a waiting period for withdrawal. A checking account paid no interest, while a savings account did. The depositor could then choose between receiving the liquidity of a checking deposit or the interest income of a time deposit. These distinctions have become blurred in recent years with the emergence of hybrid accounts that pay some interest but also carry check writing privileges. All such checkable deposits serve as money in our economy.

While savings accounts that are not checkable cannot directly be used to pay bills, they are so readily converted into money that they are referred to as **near money**. Banks today offer a number of types of interest-bearing deposits that are considered near money including Money Market Deposit Accounts and small denomination Certificates of Deposit (or "CDs").

A type of mutual fund called a **money market mutual fund** functions much like a bank account and is classified as near money. A money market mutual fund invests exclusively in short term securities of low default risk including Treasury bills and **commercial paper**, essentially a bill issued by a corporation with a high credit rating. Since these securities mature very quickly the value of the fund is so stable that the value of each share in the money market fund is fixed at $1. All interest income is credited to the shareholders after the expenses of the fund, including a management fee, are paid. What makes money market funds so attractive is that the individual shareholder receives a checkbook and can write checks up to the amount in the fund. The Credit Crisis of 2008 shook confidence in commercial paper and some of it became illiquid and of uncertain value. In order to avoid 'breaking the buck' the sponsors of mutual funds, banks and investment management firms, in

some cases extended credit to the fund or took the questionable securities onto their own balance sheet.

Let's look now at the amount of currency, checkable deposits, and near money in the U.S. economy. When we add currency in circulation to checkable deposits we have the measure of the quantity of money called M1, and when near money is added to M1 we have M2. Here is what they were in mid-2008, give or take a few billion:

Currency: $750 billion

+ checkable deposits

= M1: $1,363 billion

+ near money

= M2: $7,684 billion

As incredible as it may seem, there is over $2,500 in currency in circulation for every person in the U.S. including children! Since very few of us carries around that much cash, one wonders where it all is. A significant portion is in cash registers in stores rather than in our wallets. Another significant fraction of it circulates in foreign countries as a substitute for less stable local currencies, and in countries that have adopted a dollar-based monetary system it plays a role their monetary system. Argentina is an example. Cash also is used to hide illegal activities since by dealing in cash the parties involved avoiding leaving a record of their transactions in banks. Examples include drug trafficking, political corruption, and tax avoidance. Nobody knows for sure where all the currency is. We do know that the denomination of bills which represents the largest total dollar value is the $100 bill. This fact suggests that much of U.S. currency is used for purposes other than personal daily transactions.

You have probably been wondering how credit cards fit into the constellation of moneys. Even though we often refer to credit cards as "plastic money" they are really a loan to you from the credit card issuer, generally a bank. This loan delays payment until your monthly bill is due at which time money changes hands to settle your account. The credit card issuer earns interest on the loan not from the card holder directly but rather from merchants who accept a small discount on what they collect from the credit card issuer. Of course, if you do not wish to pay the full balance due, the bank will carry the balance as a loan to you and will charge you substantial interest. Credit cards may reduce the need to carry as much currency as one would if they didn't exist, and they surely have reduced the use of travelers' checks, but they are not themselves a form of money.

Exercises 6.1

A. Review the three most important functions that money serves in the economy. How would rapid and erratically variable inflation alter the usefulness of money?

B. The early Massachusetts colonists adopted the native American monetary system called, wampum, which consisted of white and black shell beads. One black shell was worth two white shells. Soon, the colonists discovered that when a white shell was dyed black it was indistinguishable from a naturally black one. What do you suppose happened to the composition of wampum in circulation, and how does this illustrate Gresham's Law?

C. Personal checking accounts are not generally used by households in Japan. Instead, people carry large amounts of currency and even make major purchases with currency. What aspect of Japanese culture and social behavior would you guess may account for this difference?

D. List five assets which are valuable and order them by their liquidity. Explain your ranking.

6.2 How Banks Create Money

Banks are as old as civilization itself. In the ancient world, money changers exchanged coins from abroad for local ones, and also offered deposit and safekeeping of money and valuables for their clients. There were money lenders who charged interest on loans. Roman law contained extensive regulations dealing with banking. Banking fell into disrepute during the Middle Ages when usury, the charging of interest, was condemned by religious authorities. Banking was revived in Italy during the Renaissance; the word "bank" comes from the Italian word "banco" which referred to the bench at which bankers conducted their business.

The most famous of the Italian Renaissance bankers were the Medicis, a family which established their bank in Florence in the late 1300's and accumulated great wealth and power over the next three centuries. They made Florence a center of the arts and learning and produced three Popes and two queens of France. They were also famous for disposing of those who got in their way, poison being the familial weapon of choice.

An important innovation in banking seems to have occurred in England in the 1600's. The story goes something like this:

A Fable

Long ago, a goldsmith opened up shop in a town in Olde England. The goldsmith had a stronger vault for keeping valuables than anyone else in town, so it seemed natural to offer safekeeping services to the townspeople. They soon had deposited gold and silver coins totaling £100 (English pounds) and received receipts or "notes" for that amount in

return. The goldsmith found that people only occasionally presented these notes for redemption, most of the time they were content to just hold them. At this point, the goldsmith's reserves, the coins in the vault, were exactly equal to the depositors' claims against those reserves, both £100.

After a while, the goldsmith's notes began to circulate in the community as a kind of money since people realized that the notes could be converted at any time to coins by presenting them for payment at the goldsmith's shop. Soon it occurred to the goldsmith to print up some additional notes that looked just like the original ones and lend them out. The borrower signed a loan contract, say for £10, promising to pay interest, and received from the goldsmith notes which represent a claim on ten pounds. The new notes were spent by the borrower to purchase land, and then circulated in the community along with the notes issued previously. However, now the amount of notes outstanding totals £110, which is £10 more than the amount of the goldsmith's reserves.

Gaining confidence over time, the goldsmith eventually issued a total of £200 of additional notes in return for making loans totaling £200. The goldsmith's balance sheet then looked like this:

The Goldsmith's Balance Sheet	
Assets	Liabilities
Reserves £100	Notes £300
Loans £200	
Total £300	Total £300

The goldsmith had succeeded in creating £200 that did not exist before!

Fractional Reserve Banking

And so was born fractional reserve banking, a system in which the amount of reserves held by the bank is only a fraction of the total amount of the notes or deposits outstanding. Recall that the amount of notes in circulation at first was only £100, but as a result of the goldsmith's lending there was finally a total of £300 in notes circulating in the community. As long as borrowers continued to make payment on their loans, all would be well. If the goldsmith, now banker, had used poor judgment in making loans and they were not repaid, then the liabilities of the bank would exceed its assets and eventually it would be unable to redeem its notes and the bank would fail.

Even if the loan payments were received on schedule, the bank would fail if holders of more than one third of its notes demanded their coin at once. Like modern banks discussed in Chapter 3, this bank holds illiquid assets (loans) while issuing liquid liabilities (notes). A **run on the**

bank, perhaps triggered just by rumor of failure, has always been a threat to the life of any fractional reserve bank. Incredibly, in 2008 confidence in banks reached such a low level that several major banks experienced deposit outflows that were unsustainable. These banks were merged into other banks or liquidated. The last time a run on a bank had been seen in the U.S. was in the 1930s!

Prior to the establishment of the Federal Reserve in 1913, American banks operated much like our apocryphal goldsmith. The Coinage Act of 1792 established the dollar as the monetary unit for the US and set up the first official mint to manufacture coins. The amount of silver or gold that the coins contained per dollar of face value established both the price of those metals in U.S. dollars and the value of the dollar in terms of those metals. From 1834 to 1933 the price of gold was unchanged at $20.67 per ounce. Except for the greenbacks issued during the Civil War, paper money consisted of notes issued by banks rather than governments. Bank reserves consisted of silver and gold coins, and banks issued notes backed by these reserves.

Wildcat Banking

The most colorful era of American banking was the period of "wildcat" banking from 1836 to 1864 when banks sprung up on the frontier with little more behind them than faith in the future. They took in coin deposits, made loans, and issued their notes to a sometimes trusting and sometimes skeptical public. The notes of hundreds of different banks circulated together, all claiming to be "good as gold." The notes of less trusted banks traded at a discount from face value. If a bank's loans were not repaid, or if it became the victim of a run, the notes could become worth much less than face value, or nothing at all.

The Gold Standard

Although bank notes made the promise to pay in silver or gold dollars, the total amount of notes outstanding always far exceeded the value of the banks' reserves. That, as we have seen, is the magic of fractional reserve banking. Since it was increasingly gold rather than silver that was the most important of the two monetary metals, the system based on a monetary unit that was redeemable in gold became known as the gold standard. While it did not mean that all money was backed by an equivalent amount of gold, as people sometimes mistakenly state, it did have the effect of tying the quantity of money that the banking system could create to a commodity that was in relatively fixed supply.

The gold standard was also an international system in use by the major European countries, most notably Great Britain which was the leading industrial power of the 19th century. The result was that all national currencies were readily convertible into one another since they were all equivalent to a known quantity of gold.

Modern Banks; Why Did Some Banks Fail in 2008?

The U.S. began to move away from the gold standard in the 1860s with the creation of the National Banks, which could issue notes against reserves of U.S. Treasury bonds. Then the Federal Reserve was established in 1913 and granted authority to issue its own notes Gold coins were withdrawn from circulation in 1934 in the midst of the Great Depression. Finally, the U.S. ended the practice of selling gold at a fixed price to other governments in 1971.

Today, the reserves of a bank are not silver and gold coins but rather currency and its own deposits at the Federal Reserve. The principles of fractional reserve banking, however, are essentially unchanged from the days of the goldsmith. A modern bank issues not notes but checking and savings deposits. To each account holder, the balance in their checking account is "money in the bank" available for withdrawal either in currency or by transfer by check to someone else's bank account. In fact, the bank holds only a fraction of the total deposits that it is liable for in the form of reserves; the rest is loaned out and is earning interest.

The balance sheet of a modern bank will have the same form as the goldsmith's, only the details differ.

In its simplest form it looks something like this:

The Modern Bank's Balance Sheet

Assets		Liabilities	
Reserves: currency in vault	$100		
Loans	900	Deposits	$1000
Total Assets	$1,000	Total Liabilities	$1000

This modern bank's depositors have $1,000 "in the bank," but only a tenth of that, $100, remains in the bank's vault in the form of currency as a reserve against withdrawals. A real bank will also have reserves in the form of deposits at its bank, the Federal Reserve, and it can call on these reserves in the form of currency at any time to meet demands for withdrawal by its own depositors. The remaining $900 has been lent out to households and businesses to buy everything from houses to awnings.

The interest earned by lending most of the depositors' money to others is what makes it possible for a bank to provide its depositors with convenient services such as drive-through banking and to make a profit on its investment in those facilities. For simplicity, this illustrative balance sheet omits the value of such facilities that would appear as assets on an actual balance sheet, and it omits the stockholders' equity that would appear along with liabilities as claims on those assets.

Why did many banks fail in 2008? Some loans they had made were home mortgages under terms that were so generous that home owners were at the outer limits of their ability to make monthly payments. When the economy slowed in 2008 and the real estate market started to soften, the value of these mortgages was called into question. Actual defaults on

mortgages started to rise, and more were feared. Depositors and investors started to fear that the bank's reserves would not be sufficient to meet all of its liabilities, and people started to withdraw their deposits. As some banks started to actually fail, fear of more failures drove more withdrawals until the situation reached crisis proportions. When a bank is deemed to have failed, the Federal Reserve and the Federal Deposit Insurance Corporation step in and typically arrange a merger with a stronger bank which is expected to continue operating the failed bank so that depositors can access their funds. The next section discusses these important institutions.

Exercises 6.2

A. Imagine our goldsmith decides it is safe to keep on reserve gold equal to only one fourth of the notes issued. What will his balance sheet look like after this change?

B. Explain why the gold standard made it very easy to exchange any of the major currencies for local currency anywhere in the world. Did foreign exchange dealers need to know the latest exchange rate to convert British pounds to US dollars? Why not?

C. Under the gold standard the cost of a market basket of goods changed very little over decades or even centuries. Why did the gold standard make the purchasing power of the dollar very stable?

D. Imagine that the modern bank whose balance sheet appears above decides to keep reserves equal to 20% of its deposit liabilities. What must it do to its loans outstanding to achieve this, assuming its reserves are unchanged. What will happen to the amount of deposits on its books?

6.3 The Federal Reserve System and Central Banks

The Federal Reserve is our central bank, empowered to regulate the quantity of money and the banking system and serve as "lender of last resort" when banks are unable to satisfy demands for withdrawals from their own reserves. It was established in 1913 with the hope that it would end the periodic waves of bank runs and failures which disrupted the economy and brought financial hardship to individuals unlucky enough to be caught holding the notes of defunct banks.

Measured against this objective, the "Fed," as it is called, was not immediately a success, since even greater waves of bank failures occurred in 1920-21 and the greatest of all was in 1929. The latter provided the shock that ushered in the Great Depression that lasted nearly through the following decade.

The History of the Fed

The Federal Reserve was preceded a century earlier by efforts to establish a “national” bank which would serve as banker to the federal government, issue notes of recognized value, and stabilize the private banks by providing credit in times of crisis. The idea of a central bank was always controversial in American politics, being condemned by Thomas Jefferson as a dangerous centralization of power. The First Bank of the United States was established in 1791, but its charter from Congress was allowed to lapse after only twenty years. The Second Bank of the United States was chartered in 1816, largely in response to the disorder following the war of 1812. It incurred the wrath of President Andrew Jackson, again on fear of the centralization of power and his conviction that the Bank would be hostile to the small banks he felt were crucial to the development of the American West. The Second Bank was disowned by the federal government in 1836; continuing as a state bank chartered in Pennsylvania until it failed in 1841. If it weren't for these failures, the Fed would probably have been called “The Bank of the United States,” following the model of other central banks like The Bank of England.

While central banking conflicted with the American ideal of decentralized power, the Bank of England was providing an appealing model of a successful central bank. Founded as a private bank in 1694 primarily to handle banking affairs for the government, by the 19th century it had evolved most of the functions that the Fed has today. Its notes were of unquestioned value, making the pound sterling the premier international currency of the 19th century.

Initially, the powers of the Federal Reserve System were vested primarily in twelve "district banks" while the Board of Governors, located in Washington D. C., had little central control. This decentralization was not a coincidence, but rather another manifestation of the traditional American suspicion of centralized power. After the Fed had failed to come to the rescue of the banks in 1929, evidently because of bickering between the New York Federal Reserve Bank and the Board, Congress acted in 1935 to bring the system under the effective control of the Governors. The district banks were relegated to clearing checks between banks and the largely ceremonial function of representing their districts within the Fed, although the presidents of the district banks still retain important voting rights in making policy decisions.

Deposit Insurance

Another response to the runs on the banks in 1929 and during the Depressions years was the establishment of the Federal Deposit Insurance Corporation, or “FDIC.” Depositors would no longer have a reason to rush to their bank all at once to try to withdraw their money if they knew that their deposits were insured.

Conceived as a means to stabilize the banking system, it also had the effect of shifting the risk of banking from depositors to the federal government. This left depositors with little incentives to monitor the safety of banks and many economists believe that this created a “moral hazard problem” which played a role in the banking failures of the 1980s. The consequences of moral hazard and the ensuing turmoil in the banking system will be discussed at greater length later on.

Recent Changes in Banking

With the establishment of the Fed came "national banks" which were chartered by the federal government, in contrast to charter by state government, and were required to become "members" of the Federal Reserve system. A national bank was subject to more strict regulation than a state bank, but it had the advantage of being able to borrow directly from the Fed.

Until the early 1980s there was a clear distinction between "commercial banks," which offered checking accounts as well as savings accounts, and "thrifts," which offered only savings accounts. The "savings and loan" was the most familiar type of thrift, and the "savings bank" was another variety. "S&Ls" were originally restricted primarily to residential mortgage lending with the objective of encouraging home ownership. S&Ls could be either federally chartered or state chartered, while savings banks were chartered by the states. Federally chartered S&Ls were regulated by the Federal Home Loan Bank, which operated much like the Federal Reserve, and their deposits were insured by the “FSLIC” which functioned essentially as the FDIC did for banks.

The 1980's were a time of upheaval and change in the structure of our banking system. The catalyst for these radical changes was the disastrous losses suffered by the thrifts in the 1970's as the result of soaring interest rates and inflation. Because the interest payment on a mortgage is fixed for the life of the mortgage, just as the coupon payment on a bond is fixed, rising interest rates decimated the market value of the mortgages owned by the S&Ls.

Meanwhile, the regulatory ceiling on the interest rate that S&Ls were permitted to pay depositors, called Regulation Q, meant that savings were flowing out of the S&Ls and into higher yielding investments such as Treasury bills. This loss of savings deposits is called "dis-intermediation" since it reverses the *intermediation* of savings through the S&Ls. By the end of the 1970s, many S&Ls were insolvent, meaning that the market value of their assets fell short of the their liabilities to depositors and others.

In the hope of restoring the health of the industry, Congress passed the Deregulation and Monetary Control Act of 1980. It gave thrifts the right to engage in many of the activities that were previously reserved for banks, including offering checkable deposits and making personal and business loans. It also raised the limit on deposit insurance from

$40,000 to $100,000 per account. The idea was to bolster the confidence of depositors. The "control" aspect of the 1980 Act was the extension of the regulatory authority of the Fed to all depository institutions so there ceased to be much distinction between thrifts and commercial banks. The Garn - St. Germain Depository Institutions Act of 1982, named after its legislative authors, erased most remaining distinctions between thrifts and banks. For all practical purposes, we now just have banks.

In the 1980's, desperate and imprudent thrift managements used the guarantee of federal deposit insurance of $100,000 per account to attract deposits from investors who would not otherwise have risked their savings in such shaky enterprises. More aggressive S&Ls advertised nationally to attract more deposits, promising high yields on federally insured Certificates of Deposit. Much of these funds was invested in speculative loans in situations where management had little experience or expertise in the hope of somehow making large enough profits on these new loans to dig their way out of the hole.

Economists refer to this situation as one of **moral hazard**: S&Ls with no net worth had little to lose by rolling the dice. As one Chicago S&L executive explained to the author, "if we win, great; if we lose, we just mail the keys to the FSLIC." Many of these risky loans went bad, bankrupting hundreds of S&Ls and ultimately the FSLIC itself which had to be folded into the FDIC. So far, the cost to the taxpayers of making good on deposit insurance came to several hundred billions of dollars.

Commercial banks faced similar strains, and there were many "shotgun weddings" of weak banks with stronger banks during the 1980s, with the Fed and the FDIC acting as insistent parents of the bride and groom. The fact that the assets of banks, commercial and consumer loans, tended to have shorter repayment terms meant that they were better able to adjust to rising interest rates than were the S&Ls. However, deregulation of the S&Ls and the invention of the money market mutual fund, in direct response to the desire of investors to participate in the rising interest rates of the 1970s, meant that competition for the saver's dollar became much more intense. By the 1980s banking had evolved into a dynamic and highly competitive part of the “financial services” industry where banks increasingly strived to become “financial supermarkets.”

Two decades of prosperity and growth in banking were shattered in 2008 when a faltering real estate market called into question the value of mortgages on the balance sheets of many banks. To make matters worse, the invention of ‘sub-prime’ mortgages in the 1990s, those that did not meet traditional yardsticks for credit quality, and the packaging of these into ‘mortgage backed securities’ similar to bonds, made the crisis more acute. Many banks had followed the trend to investing in these securities and no longer were able to value them accurately when the underlying mortgages began to default. At this writing the full story of this latest crisis is only now unfolding, stay tuned for more news!

The Fed Today

Partly as a result of this turmoil of the 1970s and 1980s, we now have a monetary system in which authority is highly centralized in the Fed. No doubt Presidents Jefferson and Jackson would turn over in their graves if only they knew! It is important to understand that the Fed is not part of the federal government, rather it is an independent but governmental body. The seven Governors of the Fed are appointed in a process much like that for federal judges; they are nominated by the President and confirmed by the Senate, serving for a term of 14 years. The Chairman is appointed in that capacity for a term of four years and in practice exercises considerable influence over Board decisions. Alan Greenspan is the current Chairman, having succeeded Paul Volcker in 1987.

The most important policy making body of the Fed is the Fed Open Market Committee, or FOMC, which sets the direction of policies aimed at stimulating or restraining the economy. Membership on the FOMC includes all seven of the governors and five of the twelve presidents of the district Federal Reserve banks who serve on a rotating basis. The Fed has traditionally been highly secretive in its deliberations, only releasing only vaguely worded minutes of the FOMC meetings after a gap of several weeks. Under increasing pressure from Congress to become more open, Fed Chairman Greenspan announced changes in Fed policy to the press immediately following FOMC meetings in 1994 for the first time in the Fed's history. Since then the Fed and its famous chairman have found themselves very much in the media spotlight as the importance of the Fed's role in the economy has become clear to the public. These days, every meeting of the FOMC is anticipated by widespread speculation by news analysts of what its members might be thinking and what it is likely to do. Indeed, the daily gyrations of the stock market are often traced to remarks made by an FOMC member as Wall Street tries to discern their significance as a harbinger of Fed policy moves.

Today the Fed is confronted with the Credit Crisis of 2008, massive bank failure, mortgaged backed securities on the balance sheets of banks that are illiquid and of diminished value, money market mutual funds in danger of 'breaking the buck,' and an economy that is sliding into a deep recession. It is meeting the challenge with new tools, such as loans to banks and Wall Street firms, and direct purchase of mortgage-backed securities that previously were not the range of eligible for open market operations. Assets of the Fed, in the form of loans and securities, have increased several-fold in just a year. This is crisis management on a scale never seen before, with the outcome still highly uncertain at this writing!

Exercises 6.3

A. Look at the past week's issues of the Wall Street Journal, other newspaper or newsmagazine and jot down the news items pertaining to the Fed. Summarize briefly the issues under discussion. Why do you think so much attention is paid to the Fed and it decisions?

6.4 How the Fed Controls the Supply of Money

The Federal Reserve clearly plays an important role in the economy as the issuer of currency, the regulator of banks, and the lender of last resort to banks in trouble. Its greatest influence over the economy, though, is through the control it has over the quantity of deposits in the banking system and, therefore, the quantity of money. It exercises this control through open market operations in which it adds to or reduces the reserves in the banks by buying or selling US Treasury securities. It is the FOMC that decides what the direction of these operations will be. To understand how the Fed uses open market operations to control the quantity of money we need to think a bit more about fractional reserve banking.

The fraction obtained by dividing the amount of reserves held by a bank by the amount of deposits outstanding is called the reserve ratio. The Fed requires that each bank hold a minimum fraction of reserves, called the required reserve ratio. In addition, a bank may elect to hold excess reserves above the required amount. If a bank finds that reserves fall below the required minimum, it can borrow the needed additional reserves from the Federal Reserve A bank in that situation is said to go to the discount window, referring to a figurative teller's window at the Fed where banks may borrow reserves. The interest rate which the Fed charges on these loans is called the discount rate.

There is little incentive for a bank to hold much excess reserves since, in the event of heavy depositor withdrawals, the Fed stands ready to lend needed reserves to the bank and, in the meantime, reserves do not earn interest for the bank. When a bank finds itself holding excess reserves it can make new loans which earn interest or it may lend excess reserves to other banks who are short of required reserves in the federal funds market. The interest paid on "fed funds" is determined by the supply and demand for reserves among banks and it is called the fed funds rate. Thus, a bank with deficient reserves may borrow at the discount window or in the fed funds market. It can restore its reserves over time by reducing the amount of loans it makes or more quickly by selling loans and marketable securities from its portfolio.

Open Market Operations

Now let's see how the Fed can change the amount of reserves in the banking system through open market operations in which the Fed buys

or sells US Treasury securities. If the Fed wishes to increase the amount of reserves in the banking system it need only buy a Treasury bill or bond and pay for it with new money. (Note that the Fed is not part of the U.S. Treasury. That is a department of the administrative branch of the federal government responsible for collecting taxes, making payments for goods and services purchased by the government, funding transfer payments, issuing bills or bonds to cover the budget deficit, and making the coupon and face value payments on those securities.)

To illustrate what we mean by an open market operation, imagine that the Fed bought a U.S. Treasury bond from our friend Jane for $1,000. If you bought that bond from Jane we would have to withdraw $1,000 from our bank. That would simply have the effect of transferring reserves from one bank to another, specifically from your bank to hers, leaving the quantity of reserves in the banking system unchanged. However, when the Fed buys a bond it does so with money that did not exist before.

How can it do that? The Fed simply has the legal authority to issue new money. Suppose that the Fed pays for Jane's bond with 50 new $20 bills. Jane is willing to accept this newly manufactured currency because it is legal tender and identical to all the currency already in circulation. When Jane deposits that $1,000 in currency at her bank, the amount of reserves in her bank and in the banking system will increase by $1,000.

Equivalently, the Fed could write Jane a check which she would deposit at her bank, and which the bank would then deposit in its account at the Fed, which also increases the bank's reserves by $1,000.

What will now be the reserve position of the bank where Jane deposited the $1,000 payment for the bond she sold to the Fed? If the required reserve ratio is .10 then her bank will suddenly have excess reserves of $900 since it only is required to keep $100 of that new deposit on reserve. Suppose it lends that $900 to Joe for home improvements. Joe deposits the $900 in his bank account and then Joe's bank finds itself in a position to increase lending by $810 since it only is required to increase its reserves by $90, or 10% of $900.

Money Multiplication

At each stage of this process, a new deposit gives a bank excess reserves which permits it to make a new loan which, in turn, leads to another new bank deposit. The cumulative effect will be to increase the total amount of deposits in the banking system by much more than the new $1,000 printed by the Fed.

There are two strategies for calculating the total effect of the Fed's open market operation on the quantity of money. The direct strategy is to add up all of the increments as we do in this next table:

The Cumulative Effect of $1,000 of New Reserves When the Required Reserve Ratio is .10

Bank number	receives new deposit of	it keeps .10 of it on reserve	and makes new loans of
#1	$1,000	$100	$900
#2	900	90	810
#3	810	81	729
#4	729	73	656
and so on ..	and so on ..	and so on ..	and so on ..
...	...	...	...
Totals:	$10,000	$1,000	$9,000

The table shows that the first bank, which is Jane's, receives new deposits of $1,000, of which it will keep $100 on reserve and loans out the remainder of $900 to Joe. That $900 is deposited by Joe in the second bank, which must hold $90 of it on reserve but will loan out the remaining $810. At each step, the amounts deposited, kept for reserves, and loaned out is .90 times the amounts at the previous step. That is because the reserve ratio is .10, leaving the fraction (1-.10) or .90 to be passed on to the next bank in the process.

According to the table, when the process is complete, the total amount of new deposits in the banking system will be $10,000, new reserves $1,000, and new loans $9,000. How do we know that these are the total changes that will occur, given that the number of steps in the process is, in principle, infinite? There are at least three ways to see that these totals are correct.

One way is to run the process a very large number of steps on a computer, a spreadsheet is the perfect tool for this kind of experiment, and see empirically that the totals get infinitesimally close to, but do not exceed, the totals in the table.

A more elegant approach is to make use of the result from college algebra that for any fraction, say x, it is true that,

$$\left(1 + x + x^2 + x^3 + ...\right) = \frac{1}{(1-x)}$$

which is called the geometric series. Now at each step of the process described in Table 6.1, the amount of the additional deposits, required reserve, and loan is .90 of the amount at the previous stage, so the total effect at the end of the process must be (1 + .90 + $.90^2$ + $.90^3$ + ...) times the amount at the first step in the process. Here .90 plays the role of *x* and the sum of this geometric series is 1/(1-.90) or 10. Therefore we can calculate total changes as follows:

New Deposits $= \$1{,}000 + \$1{,}000 \bullet .9 + \$1{,}000 \bullet .90^2 + \$1{,}000 \bullet .90^3 + \ldots$
$= \$1{,}000 \bullet (1 + .90 + .90^2 + .90^3 + \ldots)$
$= \$1{,}000 \bullet [1/(1-.90)]$
$= \$1{,}000 \bullet 10$
$= \$10{,}000$

and similarly,

New Reserves $= \$100 \bullet (1+.90+.90^2+..) = \$100 \bullet 10 = \$1{,}000$

and finally,

New Loans $= \$900 \bullet (1+.90+.90^2+\ldots) = \$900 \bullet 10 = \$9{,}000.$

The third way to see that these must be the correct totals is to notice that expansion of deposits continues until total deposits in banks have increased to the point that the new $1,000 in currency is completely used up as required reserves.

This observation suggests a another strategy for calculating the effect of the Fed's open market operation. With a required reserve ratio of .10, $1,000 is just enough new reserves to support $10,000 of new bank deposits. The difference, $9,000, is then the amount of new loans.

Regardless of which of the three approaches is easiest to understand, we can agree that the general formula for the change in bank deposits in response to a change in reserves is:

$$\text{Change in bank deposits} = \text{Change in reserves} \bullet \frac{1}{\text{Required reserve ratio}}$$

The multiple by which bank deposits change in response to a change in reserves is called the money multiplier. We see from the equation just above that the money multiplier is given by

$$\text{Money multiplier} = \frac{1}{\text{Required reserve ratio}}$$

How the Fed Destroys Money

When the Fed wishes to reduce the quantity of money it simply reverses the process we have described. It sells U.S. Treasury securities, draining reserves from the banks. Finding themselves short of the amount of reserves required at their current level of deposits, banks will reduce the amount of loans outstanding until they can again meet the reserve requirement. When this process is completed, total deposits in

the banking system will have decreased by the amount of the decrease in reserves times the deposit multiplier.

For example, if the Fed sells a U.S. Treasury bond from its portfolio to Bill for $1,000, he will withdraw that amount from his bank and pay it to the Fed. The bank where Bill has his account now has $1,000 less in deposit liabilities, so its required reserves have fallen by .10 of that or $100. However, its actual reserves have fallen by $1,000, the amount that Bill withdrew, so it now has $900 less in reserves than it is required to have. Deposits change by -$1,000, required reserves by -$100, so the bank needs to change the amount it has loaned out by -$900 to restore its reserves to the required level. Instead of having excess reserves as it did when the Fed bought a bond the bank now has an equivalent amount of deficient reserves when the Fed sells a bond. Bill's bank can restore its reserves by reducing its loans by $900, which it can accomplish simply by not relending money as it is paid back to the bank by borrowers. Each amount for bank #1 in Table 6.1 now has a minus sign in front of it. Of course, that $900 that bank #1 gets from repaid loans came from the withdrawal of deposits that were in another bank. That is bank #2 which now finds itself with $900 less in deposit liabilities and therefore $90 less in required reserves, but also $810 short in required reserves because it has paid out $900 from its reserves. We can now just put minus signs in front of all the entries for bank #2 Table 6.1.

This process of contraction in deposits, reserves, and loans continues until deposits have fallen by the full amount that would was previously supported by reserves of $1,000, that is $1,000 times the deposit multiplier of 10, or a total of $10,000. Reserves will have fallen by $1,000, of course, and loans by $9,000. Thus, through open market operations the Fed can either increase or decrease the supply or quantity of money in the economy.

The Fed's Policy Instruments

Open market operations are the *most important* policy instrument that the Fed has. Through its control of the money supply the Fed exercises a strong influence on the economy. As we will see in succeeding chapters, too large a money supply will lead to inflation, while too small a money supply will slow the economy down so that people become unemployed and factories idle.

As discussed earlier, open market operations are directed by the FOMC, which meets monthly. The directions of the FOMC are carried out by the New York Federal Reserve Bank, one of the twelve district banks, since it is located in the nation's financial center. The New York Fed buys and sells U.S. Treasury bonds as it seeks to supply or withdraw reserves from the banking system. By 1996 the Fed had acquired Treasury securities worth more than $400 billion through open market operations. There is nothing about Treasury securities that makes them *uniquely* suitable for open market operations, since the Fed could change bank

reserves by buying or selling *anything*. However, if open market operations were conducted in wheat, it would disrupt the wheat market and probably distort the allocation of resources to wheat production, harming consumers. (A "wheat standard" has actually been suggested by some as the basis for a sound monetary system; not surprisingly, the advocates are usually from wheat producing states!)

Incidentally, the Fed's income from interest that it collects on its portfolio of Treasury securities is used to fund its operations including the magnificent Roman-style "temple" which houses the Board of Governors on the mall in Washington D. C. and its large staff which includes about 250 Ph.D. economists. Any profit that is left over is transferred back to the U.S. Treasury. Open market operations are not actually conducted with $20 bills. Rather, the Fed deals with large banks that are dealers in Treasury securities and the Fed then credits or debits the bank's account at the Fed. Since the amount a bank has on deposit at the Fed counts as part of its reserves, this has the same effect on deposit expansion or contraction as would printed money. How can the Fed, in effect, just write checks as it pleases? Because it has the legal authority to do so!

The Fed's *second* policy instrument is to change the discount rate, the interest rate that it charges banks for borrowing reserves. The Fed makes it more or less attractive to banks to borrow reserves by decreasing or increasing the discount rate. In practice, banks do not borrow large amounts of reserves from the Fed because continued use of the discount window will result in a bank being identified as a "problem bank" which then comes under the special scrutiny of the bank examiners. Changes in the discount rate are mainly symbolic, to be interpreted as a signal from the Fed about its intentions. For example, if the Fed announces an increase in the discount rate from 3% to 3.5%, that should be interpreted as confirmation that the Fed is "tightening," intending to make reserves less plentiful and thus reducing the supply of money, or at least to slow its growth.

The fed funds rate, in contrast, is not directly set by the Fed since it is a market rate charged by banks to each other for the loan of reserves. However, the Fed can influence the fed funds rate through its control of the supply of bank reserves, as we will see in Chapter 7. The Fed will often announce a target level for the Fed funds rate, as it did in 1994 when it successively raised the fed funds target in several steps. The Fed will then conduct it open market operations, adding reserves or draining reserves, to achieve that fed funds target. The fed funds rate is also an indication to the Fed and others of the reserve position of the banks; a higher fed funds rate indicates that reserves are scarce and a lower one that reserves are plentiful. The fed funds rate is observed every day, while statistics on the actual amount of reserves is reported only with a delay and even then is subject to technical problems of interpretation.

The *third* policy instrument available to the Fed is changing the required reserve ratio, but this is done very infrequently.

The Fed's use of these three instruments is referred to as monetary policy. In the next three chapters we see how monetary policy affects the level of interest rates in the economy, how interest rates in turn influence purchasing decisions by firms and households, and thereby how monetary policy affects employment, income, and inflation.

Exercises 6.4

A. Suppose that the reserve ratio is .20 and the Fed conducts an open market operation in which it purchases $1 million in Treasury bonds. What will be the impact on the supply of money? on bank reserves? on bank loans?

B. Now consider what would happen in the above scenario if the Fed instead sold $1 million in bonds out of its portfolio.

C. Suppose that Congress passed a law that made gold the only acceptable asset for banks to hold as reserve against deposits. What would this do to the Fed's ability to change the supply of money?

D. Imagine that someone counterfeits one thousand $20 bills that are undetected as fake. Explain what effect the spending of these bills will have on the money supply.

END