Main concepts: The meaning of money, the Federal Reserve System, banks and money supply, the Fed's tools of monetary control

Introduction

In the absence of money, people would have to exchange goods and services **through barter**.

The problem with barter lies in finding <u>a double coincidence of wants</u>: a successful trade requires (i) you to want what your trading partner has and (ii) your trading partner to want what you have.

Money overcomes this problem, since everyone will accept it in exchange for goods and services.

But how exactly is money defined? What are its functions? How does the government control the supply of money? And what role do banks play in the money supply process?

These questions are the focus of this chapter.

The next chapter will begin to relate changes in the supply of money to changes in other key economic variables.

Outline

- 1. The meaning of money
- 2. The Federal Reserve System
- 3. Banks and money supply
- 4. The Fed's tools of monetary control

1. The Meaning of Money

Sometimes people will say, "Bill Gates has a lot of money." But what they really mean is that Bill Gates has a lot of wealth.



Economists use the term "money" in a more specific sense, to refer to the set of assets that people use regularly to buy goods and services form other people.

Functions of Money

- 1) Money is <u>a medium of exchange</u>, that is, an item that buyers give to sellers in exchange for goods and services.
- 2) Money is <u>a unit of account</u>, that is, the units in which prices are measured.
- 3) Money is <u>a store of value</u>, that is, an object that people can use to carry wealth from the present into the future.

Closely associated with the concept of money is that <u>of liquidity</u>: the ease with which an asset can be converted into the economy's medium of exchange.

- By definition, money is the most liquid asset.
- Stocks and bonds are pretty easy to buy and sell. They are highly liquid assets.
- Houses, valuable paintings, and antiques take more time and effort to sell. They are less liquid.

Notice that the first two items on this list highlight a trade-off. <u>Money is</u> the most liquid asset, but currency does not pay interest. Bonds are less liquid, but pay interest. This trade-off will become important later on in our analysis of how changes in the money supply affect the economy as a whole.

Kinds of Money

Historically, gold or gold coins served as money. This type of money, that takes the form of a commodity with intrinsic value, is called commodity money.

US dollar bills have value, but that value is not based on the intrinsic value of the paper and ink themselves. Money without intrinsic value is called **fiat money**, since it is used as money because of government decree.

Money in the US Economy

The money stock is the total quantity of money circulating in the economy.

Suppose we want to measure the money stock for the US. What assets would we include in our measure?

- 1) <u>Certainly currency</u>, the paper bills and coins in the hands of the public.
- 2) Probably checks as well. **<u>Demand deposits</u>** are the official name given to bank deposits that customers can access on demand by writing a check.
- 3) Maybe <u>savings deposits</u>. Banks won't let customers write checks on savings deposits, but they still can withdraw the funds anytime.
- 4) Maybe also **money market mutual funds**, some of which offer limited check-writing privileges.
- 5) Maybe also <u>time deposits</u> (also called <u>CD's</u> or <u>Certificates of</u> <u>deposit</u>.) Here, the funds can't be withdrawn without penalty for a fixed amount of time, but that amount of time tends to be short <u>three to six months</u> so these assets, too, are fairly liquid.

Evidently, the choice of what to include is not entirely clear-cut. For this reason, there are several official measures of the US money stock. Two of the most widely used are:

- <u>M1</u>. Includes only those assets that are clearly used as a medium of exchange: currency, demand deposits, traveler's checks, and "other checkable deposits" which is the official term for interest-earning checking deposits.
- <u>M2</u>. Includes everything in M1, plus other highly liquid assets: <u>savings deposits</u>, money market mutual funds, and small (under \$100,000) time deposits.

Figure 1 shows some data on M1 and M2 in 2012. Which measure is bigger? Why?



US Money Supply Measures, December 2012

Note: All figures in billions of dollars.

Currency	1090.9
Traveler's Checks	3.8
Demand Deposits	901.7
OCDs	443.7
TOTAL M1	2440.1

TOTAL M1	2440.1
Savings Deposits	6694.5
Small CDs	632.6
MMMFs	635.1
TOTAL M2	10402.4

What about credit cards? Credit cards are clearly used to make purchases. Why aren't they included in M1?

The reason is that credit cards are a means for deferring payments as opposed to making payments. At the end of the month, when you pay your credit card bill with a check, you are using the medium of change to finally pay for what you purchased earlier.

But while credit card balances are not included in M1, they clearly influence the level of M1. Before credit cards use became widespread, people had to hold a lot more currency.

Here's one other puzzle.

- In 2009 the stock of US currency in circulation was \$862 billion.
- In 2009, there were 236 million adults in the US.
- \$862 billion / 236 million people = \$3,653 per person!
- A lot of this currency is held overseas, as a store of value in countries with unstable political or economic systems.
- Undoubtedly, some of this currency is also held by drug dealers and other criminals.

2. The Federal Reserve System

<u>The Federal Reserve</u> (Fed) is the central bank of the US: institution responsible for overseeing the banking system and regulating the quantity of money in the economy.

The Federal Reserve System consists of:

- The Board of Governors in Washington DC
 - o Seven Board Members, called "Governors" with 14-year terms.
 - o Including the chairperson of the Federal Reserve System: formerly Alan Greenspan and now Ben Bernanke.
- Twelve Federal Reserve Banks
 - o Located in major cities, including Boston and New York.

As a central bank, the Fed has two jobs:

- 1. It regulates banks, assists in check processing (clearing), and acts as a bank for banks taking their deposits and, when other sources of credit dry up, making loans to banks. In this last role, the Fed is said to be the lender of last resort.
- 2. It <u>regulates the money supply</u>: the quantity of money in the economy. That is, it <u>conducts monetary policy</u>.

The monetary policymaking committee at the Fed is called the <u>Federal</u> <u>Open Market Committee (FOMC)</u>. The <u>FOMC meets every six weeks</u> and consists of the <u>seven Governors</u> plus the 12 Reserve Bank Presidents. All seven Governors vote on committee decisions; a rotating group of 5 Reserve Bank Presidents vote as well, with the President of the New York Fed always a voting member.

But exactly how does the Fed regulate the supply of money? By conducting **open market operations**, that is, **by buying and selling US Government bonds**. Loosely speaking:

- The Fed increases the money supply by using newly-created money to buy US Government bonds held by private investors.
- And decreases the money supply by selling US Government Bonds to private investors.



3. Banks and money supply

Because even the narrowest measure of money, M1, includes both currency and demand deposits, banks play a key role, together with the Fed, in the money supply process. But how exactly do banks participate in this process?

The simple case of 100 Percent Reserve Banking

Start by considering an economy without banks, where all money consists of currency.

Suppose for simplicity that the total quantity of currency in circulation is \$100.

Now suppose that someone opens up bank: call it the First National Bank.

But instead of making loans, all this bank does is to safeguard people's money: it accepts deposits, and keeps the currency in its value until depositor either asks for the currency back or writes a check against his or her balance.

Deposits that the bank receives but does not loan out are <u>called reserves</u>. So this simple form of banking without loans is called <u>100-percent-reserve banking</u>, for the obvious reason that 100 percent of all deposit held as reserves

We can use a <u>T-account</u> (a simplified balance sheet), to show what happens if the entire \$100 of currency in circulation is deposited in the bank:

First National Bank

Assets	Liabilities
Reserves \$100	Deposits \$100

What has happened to the M1 money supply as a result of this transaction?

- Nothing!
- Currency in circulation declines by \$100.
- But demand deposits rise by \$100.

This first example illustrates that in an economy with <u>100 percent-reserve banking</u>, banks do not influence the money supply.

Money Creation with Fractional Reserve Banking

Now suppose that the managers of the First National Bank notice that not all of the bank's depositors ask for their back on any given day. In fact, most customers are content to leave their money in the bank. And besides, even if some customers come in and ask for their money back, other customers may come in and deposit even more.

In the US today, banks can hold reserves in the form of <u>vault cash</u> or as <u>deposits at the Fed</u>. As its name suggests, vault cash consists of dollar bills physically held by banks in their vaults. And as we all know, dollar bills do not pay interest. Deposits at the Fed represent the value of the dollar bills a bank deposits at the Fed. The Fed pays interest on the funds that banks deposit, but at a rate that is generally below what the bank could earn by lending those funds out to a consumer or business. So what if the bank managers choose to lend some of the bank's money out, in an effort to increase the interest income the bank receives?

Now we must consider a <u>fractional-reserve banking system</u>, in which banks hold only a fraction of the funds they receive from depositors as reserves.

<u>The reserve ratio</u> measures the fraction of deposits that banks hold as reserves.

Although banks want to lend funds out, in order to earn more interest income, they will always hold at least some reserves:

- Partly because they are required to by law. The Fed sets a minimum reserve ratio that each bank must maintain. Reserves held to satisfy this legal requirement are called **required reserves**.
- But banks will also hold <u>excess reserves</u> above what is legally required to cope with depositor's request for withdrawals.



Let's suppose that First National Bank decides on a reserve ratio of 10 percent. Then it holds \$10 (or 10 percent) of its deposits as reserves and lends out the rest. The T-account now becomes

First National Bank

Assets	Liabilities
Reserves \$10	Deposits \$100
Loans \$90	

What's happened to the money supply as a result of this transaction?

- It has increased!
- Depositors still hold \$100 in demand deposits.
- But now the people who receive the loans hold \$90 in currency.
- The total money supply is \$190

This second example illustrates that in a fractional reserve system, banks can create money.

Notice, however, that while the money supply has gone up because of this transaction, people aren't really wealthier:

- The depositors have \$100 in deposits, just as before.
- The borrowers have \$90 in currency, but now they owe that \$90 to the bank. So that balances out too.

Another way to think about this is that people aren't wealthier, but they are more liquid.

The Money Multiplier

In an economy with a fractional reserve banking system, however, the action does not really stop at the end of this second example.

Now the First National Bank's borrower has \$90 in currency. Presumably, that borrower wanted the funds in order to buy something: consumption good or an investment good.

But then the seller of this good gets the \$90. Let's suppose that he or she taken that currency, and deposits it in his or her bank: the Second National Bank.

If the 2nd National Bank also chooses a 10 percent reserve ratio, it will take the \$90 in currency, hold \$9 (10 percent) as reserves, and lend out the remaining \$81. It is T-account appears as

Second National Bank

Assets	Liabilities
Reserves \$9	Deposits \$90
Loans \$81	

What does this do to the money supply?

- The First National Bank's customers have \$100 in deposits.
- The 2nd National Bank's customers have \$90 in deposits.
- The 2nd National Bank's borrower has \$81 in currency.
- Now the money supply is \$100+90+81 = \$271!

But now the 2nd National Bank's borrower uses the \$81 in currency to buy something. The seller takes the \$81 and deposits in his or her account at the Third National Bank.

The 3rd National Bank, if it also chooses a 10 percent reserve holds \$8.10 (10 percent) of the \$81 as reserves, and lends out the remaining \$72.90. Its T-account appears as

Third National Bank

Assets	Liabilities
Reserves \$ 8.10	Deposits \$81
Loans \$72.90	

What's the money supply now?

- The 1st National Bank's customers have \$100 in deposits.
- The 2nd National Bank's customers have \$90 in deposits.
- The 3rd National Bank's customers have \$81in deposits.
- The 3rd National Bank's borrower has \$72.90 in currency



- Now the money supply is \$343.90.

We could go on and on, repeating this forever. The 3rd National Bank's borrower buys something, the seller deposits the funds in the Forth National Bank, which keeps 10 percent as reserves and lends the rest out....

But notice in each step, the additions to the money supply gets smaller and smaller. So eventually the process will converge. Use a calculator or better yet a computer spreadsheet to do the endless repetitions and what you will find is that when the banking system finally holds the entire \$100 as reserves, the money supply is \$1,000.

In this case, the money multiplier – the amount of money that the banking system generates per dollar reserves – is 1000 / 100 = 10.

In this example, where all banks choose a reserve ratio of 10 percent, is it an accident that the money multiplier is 10? No!

In general, if

R = the reserve ratio

then,

1/R = the money multiplier

So if as in our example R = 0.10 or 10 percent, then the **money multiplier** is 1/R = 1/0.10 = 10.

To see why this reciprocal formula must be true, remember that the reserve ratio measures the fraction of deposits that banks hold as reserves:

R = Reserves / Deposits

Or

Deposits = (1/R) * Reserves

In our example, everyone deposits all of their money, so

Money supply = deposits = (1/R) * Reserves

But now remember that the money multiplier is defined as

Money Multiplier = Money Supply / Reserves = 1/R

This last set of calculation reveals **two important assumptions** that are built into our second example:

- 1. All banks have the same reserve ratio R.
- 2. All bank customers hold all of their money as deposits.

What happens when **the first assumption is violated**, say because some banks choose to hold more reserves?

- The money multiplier goes down, because when some banks hold more reserves, they make smaller loans, so the process of monetary expansion is curtailed.

What happens when **the second assumption is violated**, say because some people choose to hold some currency as well as deposits?

- Again, the money multiplier goes down, because when some people hold some currency, they deposit less, and again the process of monetary expansion is curtailed.

4. the Fed's tools of monetary control

But, as long as banks do not hold all of their deposits as reserves, and as long as people don't hold all of their money as currency, the fractional reserve system allows banks to play a key role in the money supply process.

The Fed must take banks' role into account when making monetary policy decisions.



Open Market Operations

Recall that open market operations occur when the Fed buys or sells US Government bonds from or to private investors.

When the Fed buys US Government bonds, each newly-created dollar held as currency increases the money supply by \$1. But each newlycreated dollar held as a deposit increases the money supply by even more, because of the money multiplier.

And when the Fed sells US Government bonds, if the buyer pays for the bond with currency, the money supply decreases by \$1. But if the buyer pays for the bond using funds from a bank deposit, the money supply deceases by even more, as the process of multiple deposit creation works in reverse

Open market operations are easy for the Fed to execute. There is a trading desk at the Federal Reserve Bank of New York that links the Fed to the US Government bond market. The Fed can trade in this market just like all other financial institutions and individual investors.

Open market operations can also be used to change the money supply by large or small amounts.

Because of these advantages, open market operations are the Fed's most frequently-used policy tool.

Reserve Requirements

Reserve Requirements are the legally-imposed minimum amount of reserves that banks must hold against their deposits.

We've already seen that a higher reserve ratio leads to a smaller money multiplier.

The same reasoning implies that when the Fed increases reserve requirements, the money supply will fall.

But changes in reserve requirements disrupt bank business. To avoid these disruptions, the Fed rarely uses changes in reserve requirements to affect the money supply.

The Discount Rate

The Fed also acts as a <u>lender of last resort</u> for banks that cannot obtain funds through other sources.

This <u>discount rate</u> is <u>the interest rate that Fed charges on its loans to banks</u>.

When the Fed makes a loan to a bank, in effect it lends newly-created money to that bank. The bank has more reserves, some of which it can lend out. Through the process of multiple deposit creation, the money supply will rise.

Hence, when the Fed lowers the discount rate, including more banks to borrow from the Fed, the money supply will rise.

But the Fed rarely uses discount lending to control the money supply. Instead, it uses its role as lender of last resort to <u>help banks when they</u> are in financial trouble.

Problems in Controlling the Money Supply

All of this discussion highlights that the Fed cannot perfectly control the money supply.

It cannot control how much money people hold as currency as opposed to depositing in banks.

And it cannot control how much banks hold in reserves as opposed to making loans.

In practice, therefore, Federal Reserve analysts need to constantly monitor the behavior of banks and their depositors, to keep the money supply on track.

The Federal Funds Rate



The Federal funds rate is the interest rate that banks charge each other on very short-term loans of reserves or "federal funds"

- 5. The classical theory of inflation
- 6. The cost of inflation
- ⇒ Next lecture topics!