

Lecture on Money, the Money Market and the Banking System

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1 THE DEFINITION OF MONEY: WHY PEOPLE HOLD AND USE MONEY

Money is a Medium of Exchange. Extraordinarily important role in facilitating exchange and eliminating cumbersome barter. Definition of money has changed considerably over the past few decades. 70 - 80 years ago almost all transactions were paid by cash. Thirty years ago cash and interest-free checking accounts. Recently other assets: interest bearing checking accounts, savings accounts, money-market mutual funds, credit cards. In order to be usable as a medium of exchange an asset must be (1) acceptable, (2) protected from counterfeiting, and (3) divisible (for small transactions).

Money is a Store of Value. Allows one to store up purchasing power until you need it. If you held your wealth in fresh eggs, you would see the value of money. Cash money is a store of value but it's not as desirable as others

because (1) it pays no interest, (2) it is not protected against inflation, (3) it is subject to theft and robbery.

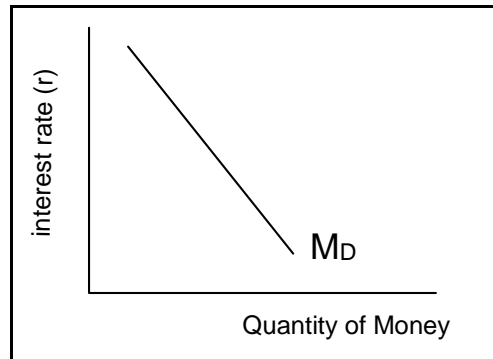
Money is a Unit of Account. Extraordinarily valuable as a measure of the relative value of different commodities. It provides a way of recording receipts, expenditures, assets, and liabilities.

There are two kinds of money: **commodity money** which has an intrinsic value itself, (e.g., gold and silver) and **fiat money** which has no intrinsic value but acquires its value from the willingness of people to accept it in exchange.

2 The Demand for Money

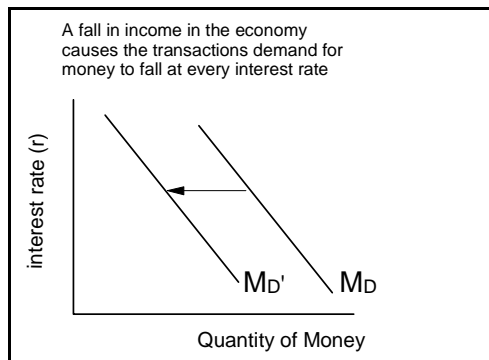
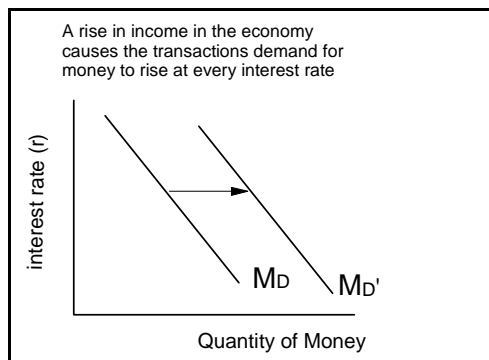
We've seen that money is an extraordinarily useful commodity; however, to hold money involves an **opportunity cost**. If you hold cash, or put your money in a checking account you forego the interest you could earn if you put the funds into a savings account or into a money market fund or lent it to someone. When bonds are paying high interest rates, their prices tend to be low, making them a good value to investors, particularly if they believe that they will be able to sell them at a higher price when interest rates fall. This is the **speculative motive** holding less money when interest rates are high and more when they are low. Consequently, the higher the interest rate, the higher the opportunity cost of holding money, the less you are likely to want to hold. So, if the interest rate is the "price" of holding

money, the demand curve with respect to the interest rate will be downward sloping:



Of course, there are other reasons for holding money:

- ◆ **Transactions demand:** We need to hold money simply to make transactions on a daily, weekly or monthly basis. Generally, the higher our incomes, the more transactions we are likely to make and the higher our transaction demand for money.



- ◆ **The precautionary motive:** We also hold money to protect us in case of emergency. It's not clear how the precautionary motive changes as macroeconomic variables change. If people fear a bout of high inflation they will reduce their precautionary monetary holdings. If they fear that the banking system will collapse, they might want to hold more money.

3 HOW THE QUANTITY OF MONEY IS MEASURED

There are, in fact, many definitions of money in use by bankers, policy makers and analysts

today. The two most important are "**M1**" and "**M2**". M1 corresponds most closely to the definition of money as a medium of exchange, while M2 contains assets that have "store of value" characteristics.

Seasonally Adjusted Components of M1, and M2 Period Ending May 17, 2010 (\$ Billions)		
Component	Component of M1	Component of M2
Currency	881.7	
Transactions accounts		
Demand Deposits	430.0	
Other checking deposits	367.1	
Traveler's checks	5.0	
Equals M1		1,683.8
Savings deposits		5,077.4
Small-denomination time deposits and certificates		1,069.9
Retail Money Funds		742.2
Equals M2		8,573.3
Source: Federal Reserve Statistical Release H.6 (508) May 27, 2010		

M1 contains the following components:

- ◆ **Currency**, including coins and paper currency ranging in denomination from \$1.00 to \$100.00
- ◆ **Transactions accounts**, including demand deposits (non interest bearing checking accounts) at commercial banks, and other deposits upon which checks can be written (e.g., NOW accounts, "Super NOW accounts, automatic transfer (ATS) system, etc.)
- ◆ **Traveler's Checks** outstanding.

M2 includes all of **M1** plus:

- ◆ **Savings Deposits.** Passbook savings accounts, and statement savings accounts that allow withdrawal and deposit by mail.
- ◆ **Savings certificates, less than \$100,000 in denomination.** They have differing maturity dates ranging from 6 months to several years, and have either fixed or floating interest rates.
- ◆ **Money-market mutual funds.** Funds that invest only in short-term securities (usually maturing in less than 90 days) and allow the writing of an unlimited number of checks over a specific minimum value (e.g., \$500).

Ambiguities over the definition of "money" clearly cause problems for monetarists and others who advocate a "constant-growth-rule" for the money supply. The question is "*Which Money Supply?*"

4 HOW BANKING BEGAN & THE BANKING SYSTEM

Banking developed out of a service offered by early Renaissance goldsmiths, who offered their customers a safe place to store their precious gold which was *the* universally accepted means of exchange and store of value. As long as their sole function was to store gold, this service of goldsmiths was of little interest to economists.

Most depositors did not remove their gold from storage at the same time or in a complete amount; moreover, it was dangerous to carry gold in public, for the obvious reasons. Depositors needing to make payments found it safer and more convenient to carry and transfer *promises to pay gold* than to use the gold itself. As a consequence, goldsmiths started to offer a second service: notes promising to pay gold upon demand.

It was only when goldsmiths realized something very important that banking as we know it today began: Because most gold never left storage, the claims on the goldsmiths actually to produce gold never even closely approximated the total amount of gold on hand. Goldsmiths found that they could actually make loans to individuals in an amount that exceeded the total stock of gold on hand. Because these loans in the form of notes promising to pay gold were more convenient to deal with than the gold itself, the notes took on a life of their own. They began to circulate in the economy *without ever being presented at the goldsmith-bank for redemption in gold*. Banking as we know it today had begun, and the goldsmiths' notes became the first form of paper money.

It's clear that the more loans banks make for which they earn interest, the more profits they make.

The tension between profits and safety comes in the decision as to how much more than the bank's reserves is actually lent. As long as not everyone attempts to get cash from the bank at once, the bank can lend out a high multiple of its reserves. This is called **fractional reserve banking**, and many banks historically have gotten too greedy and lent out too much money or made loans that could not be repaid, thus not being able to withstand "runs" on the bank. This can cause the very banking crises that the Federal Reserve was established to prevent. The most recent example is, of course the crisis in the banking system in the fall of 2008. So,

even though the Fed is supposed to prevent such crises, it is not always successful. We'll talk more about this as we discuss macroeconomic policy.

5 THE DEPOSIT MULTIPLIER

How a monopoly bank creates money: Assume that in our economy there is only one bank.

Assume further that this bank is required to keep a certain proportion of its reserves (cash) on hand:

$$\frac{\text{Reserves}}{\text{Deposits}} \geq RR_r \text{ where } RR_r \text{ is the required reserve ratio.}$$

Assume that the bank receives 100 dollars from its depositors. It is required to keep $RR_r = .2$, say 20 percent, in the bank vaults. Consequently, the bank can make loans of \$80 dollars in cash to a borrower. (T account)

Assets	Liabilities
Required Reserve \$20	\$100 Deposit
Loan to A \$80	
Total \$100	Total \$100

After the borrower has made his payments to other members of the public, the \$80 dollars in cash will be redeposited in the bank. The bank's deposits (liabilities) have now risen to \$180 and its assets are: required reserves \$36, excess reserves \$64, 1 loan to borrower A \$80. Again, the bank has excess cash reserves on hand, and it can make a second loan, totalling \$64. (T account)

Assets	Liabilities
Required Reserve \$36	\$100 Deposit
Loan to B \$64	\$80 Deposit
Loan to A \$80	
Total \$180	Total \$180

After borrower B has made his payments, the public again deposits the \$64 in cash in the bank. Bank deposits rise to \$244 and assets include \$48.80 required reserves, \$80 loan to borrower A, \$64 loan to borrower B, and excess reserves of \$51.20. (T account {<=})

Assets	Liabilities
Required Reserve \$48.80	\$100 Deposit
Excess Reserves \$51.20	\$80 Deposit
Loan to B \$64	\$64 Deposit
Loan to A \$80	
Total \$244	Total \$244

Clearly this process can go on until the bank has made sufficient loans to use up all of its excess cash reserves. The bank's final balance sheet will be: (T account).

Assets	Liabilities
Required Reserve \$100	\$100 Deposit (Initial)
Additional Loans \$204.80	\$80 Deposit (2d)
Loan to C \$51.20	\$64 Deposit (3d)

Loan to B	\$64		\$256 Additional Deposits
Loan to A	\$80		
Total	\$500		Total \$500

Liabilities will include the deposit owed to the initial depositor, and all subsequent deposits. Assets will include \$100 required reserves, loans to borrowers A, B, C, etc., totaling \$400. It takes \$400 of loans to exhaust excess reserves.

<<But what has happened to the total amount of purchasing power in the economy?>> It has expanded from \$100 to \$500 because of the bank's activities in creating loans that far exceed the cash it actually has on hand.

<<What determines the maximum value of deposits a bank can actually have?>>

The required reserve ratio:

$$D(\max) = \frac{R}{RR_r}$$

where R is cash or "high powered" money

if $R = 100$ and $RR_r = 0.2$

$$D(\max) = \frac{100}{0.2} = \$500$$

The assets include \$100 in cash and \$400 in loans to cover total deposits worth \$500.

We can see that the bank's ability to create new deposits is limited by the amount of cash or high-powered money available. The central bank, (in the U.S., the Federal Reserve Bank) controls the supply of high-powered money in the system, and by extension, the total supply of money.

If the Fed wishes to increase the quantity of money in the system, all it has to do is increase the supply of high powered money, bank reserves, R :

$$\begin{aligned}\Delta D &= \frac{1}{RR_r} \Delta R \\ &= \frac{1}{0.2} \Delta R \\ &= 5\Delta R\end{aligned}$$

The reciprocal of the required reserve ratio is the **deposit multiplier**. The tools available to the Fed relate either to its ability to add or subtract high powered money or to change the required reserve ratio.

Note, when the Fed acts by adding to bank reserves, it is adding both the reserves and the subsequent deposits through deposit creation. In that case the total money supply (or purchasing power) has increased by the amount of the deposit multiplier. However, if an eccentric miser takes \$10,000 from under his mattress and deposits it in the bank, then the *increase* in purchasing power is only the amount of *additional deposits*, since \$10,000 cash was initially withdrawn from circulation and then deposited. The net increase in *money (or purchasing power)* is just the amount of induced deposits, not including the original deposit.

Our money creation formula is oversimplified for two reasons:

- ◆ It assumes that each recipient of a bank loan redeposits the money in another bank, so that bank can in turn lend it out. Since some of the loan is held as cash by the borrower, the money creation multiplier is not as large as our formula suggests. This includes all sorts of cash that people have in dresser drawers, piggy banks etc. For example, I recently cleaned out my dresser drawer and found the following:

Pennies	745	=\$7.45
Nickles	112	=\$5.60
Dimes	132	=\$13.20
Quarters	30	=\$7.50
	1,019	\$33.75

1.

Think about how much cash money is in “circulation” but not really circulating if most of the population has dresser drawers like this!

- ◆ It assumes that each bank does not hold any excess reserves, but lends out to the legal minimum. Many banks do not lend out that much; hence the money multiplier is not as large as the formula would suggest.

6 THE NEED FOR MONETARY CONTROL

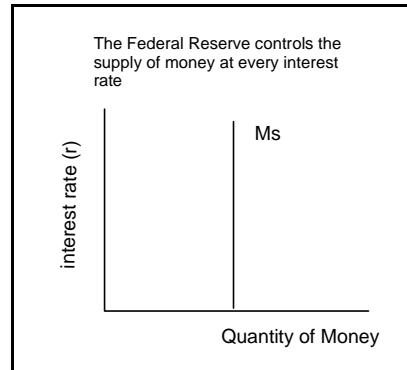
Banks have tremendous power over the money supply. Small changes in their behavior can

cause the money supply to expand (or contract) greatly. In a boom, banks are tempted to lend to the limit of their capacity; this can be inflationary. On the other hand, in a recession banks might be very cautious and keep high excess reserves; this can prolong and deepen the recession.

Because the money supply is an important determinant of aggregate demand for goods and services, regulation of the money supply is important in order to keep the demand for goods and services stable.

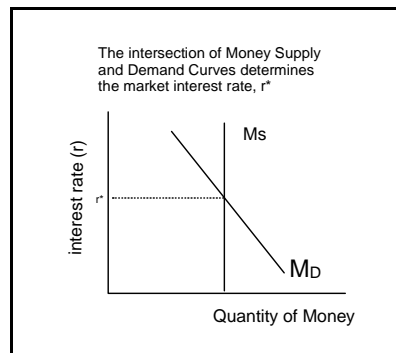
7 The Supply Curve for Money and Money Market Equilibrium

For now we'll assume that the Federal Reserve has absolute control over the supply of money outstanding in the system. So, it doesn't matter what the interest rate is, as far as the supply of money curve goes:

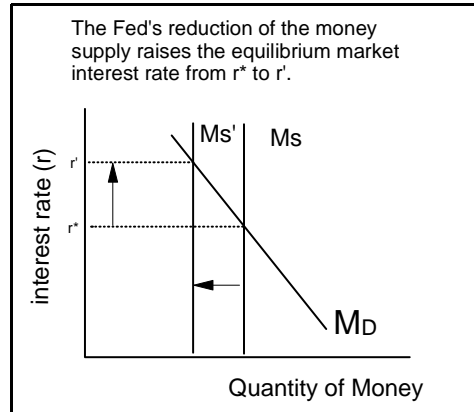


7.1. Equilibrium in the Money Market

Combining the supply of money and demand for money curves in one graph, we see that the market interest rate is determined by the intersection of those two curves.



The Federal Reserve, by manipulating the money supply can change market interest rates:



We will see later how the Fed uses its power over the supply of money to affect not only the money market but the market for real goods and services (and the entire economy) as well.