

MACROECONOMICS 201
Spring 2020
NOTES 10

**MONETARY POLICY AND ITS EFFECTS ON AGGREGATE DEMAND AND THE
CONSEQUENCES THEREOF**

- A. Banks and the creation of money
- B. Effect of other financial intermediaries
- C. Near moneys and money substitutes
- D. Role of the Federal Reserve System

Reading Assignments:

Principles of Economics: Chapters: 27 & 28
Madariaga: 29, 30

Introduction

Monetary policy, i.e., the manipulation of the amount of money in the economy, the amount of available funds that can be lent, and the level and composition of interest rates, has become, in a reasonably well functioning economy, the *stabilization tool of first choice*. However, during the 1930's, and as a direct consequence of the depression, the role of monetary policy and interest rates was downplayed. Instead, economists focused on changes in government spending and taxes. In fact, the usual policy recommendation especially after Keynes, was to increase government spending on public works in order to reduce unemployment. This was largely a consequence of the fact that in times of massive unemployment, monetary policy was not considered particularly effective, since few people wished to incur debt or risk investing money when jobs are not secure and markets are weak. This sounds similar to the situation in the recent great recession as interest rates were pushed down about as far as they could go. You may sometimes hear this described as the "*liquidity trap*" since interest rates cannot fall enough to encourage enough increased spending/investment to bring the recession to an end.

After WWII, many economists began to re-examine and re-emphasize the importance of monetary policy on AD and/or AE. Remember, any change in AE will also change AD. This made perfect sense given that the economy was often quite prosperous, and while unemployment was sometimes a problem, so was inflation beginning to be seen as a problem, and equally importantly, it became obvious that changes in interest rates could have a dramatic effect on spending, both upward and downward. Remember the effects on prices and output as you move along our AS curve. Lowering interest rates would often lead to increased investment (by lowering costs of investment) and increased consumer borrowing for homes, cars, and consumer goods, and sometimes could cause a significant increase in AD and inflation. Raising interest rates, of course, would have the opposite effect. In this set of notes, we will discuss the different tools of monetary policy and how it is carried out

1. What is Money?

A. *Money, narrowly defined*, is *any* commodity that people will readily accept in exchange for goods or services. One long-time definition was that money is defined as *checking deposits* (we will consider savings deposits a little later), and *paper and metal money* held by the **nonbank** public, i.e., in

circulation and *not in bank vaults*. Note that dollars, considered money in the U.S., will not be counted as money in most other countries, nor will the currency of other countries be counted as money in the U.S.

Many items have served as money in various times and countries, e.g., Shells, gold, silver, iron, cocoa beans, etc. It originated largely as a means of expediting the exchange of goods and services (barter was effective only in very primitive societies). Generally (in the past), it was something precious and rare and easily transportable, **often gold or silver, and had intrinsic value**, that is, the *market* value of gold or silver metal determined the value of money. Even in this country, money was defined in terms of the value of gold **until 1971**, when we were finally forced to admit that we couldn't possibly redeem all of our currency certificates (denominated in dollars) - the federal government had previously promised holders that they could redeem them for gold) at the existing value of gold

In consequence, at present, the entire money supply of the U.S. is based *solely* upon peoples' *confidence* that U.S. currency will remain reasonably stable in terms of what it will buy and will be readily accepted *at face value* by other persons in the U.S. It must be emphasized that even coins no longer have a value equal to the metal contained in them, and the value of paper money or checks depend *solely* upon peoples willingness to accept paper money or checks in payment for a purchase or to satisfy a debt. Paper money maintains value *only* because people *believe* it has value and are confident (sometimes) that the U.S. government will manage it wisely, and not because of any intrinsic commodity value. Once again, our money is not redeemable in gold and in fact, has little relationship to the value of gold. Do not panic. Do you know anyone who would turn down a \$100 bill? But they might if they expected rapid inflation.

Interestingly, the Federal Reserve system (the central bank in the U.S.) and the European Central Bank (and other central banks) have set a rough target of 2 percent inflation each year. This target is not set legislatively, but by the judgement of the managers of the central banks and probably reflects the belief that a low level of inflation makes it easier for a dynamic economy to adjust for the many changes that are constantly occurring. Certainly, if rising prices contribute to an increase in wages, it will make it less difficult for debtors to continue servicing their debt. However, this target can change depending upon changing economic conditions and changing attitudes among the managers of these central banks.

Irrelevant fact. Until recent times, money consisted largely of coins which were valued by the amount of gold or silver they contained. This gave rise to the practice of the government minting coins so that people would have confidence that they really contained the stated purity and amount of metal. Coins, in earlier times, were equally valuable as money or as melt. Can you guess what *clipping* or *sweating* is when precious metals are used as money. Sometimes the death penalty was imposed for these offenses. It seems as if people will always look for a way to beat the system, even when it involves great personal risk.

B. *Legal tender*, is that part of the money supply which, by federal law, must be accepted in exchange for goods/services, or to discharge a debt. About the only asset in this country that can absolutely be considered legal tender is coins and currency. You cannot compel people to accept a personal check, although few people refuse to do so. Even defining coins and currency as legal tender is questionable, since a store cannot be required to accept a very large bill, i.e., a thousand dollar bill, for a small purchase, and apparently, a sack full of pennies may also be refused. However, these are unimportant exceptions to the rule.

2. What is a liquid asset and what is liquidity?

Liquidity refers to the *ease* with which an asset can be quickly exchanged for money. This is a hazy

concept since almost any asset can be quickly converted to money, but some may require conversion at a very low price if speed is important. Some economists have added the term, “at a fixed price” to the definition of liquidity, but I find that a little hazy because who knows what a fixed price is, or should be, for many assets, e.g., a house, stocks, even bonds. Generally, I think that liquidity should be defined as the ease with which an asset can be converted into money without incurring a steep discount from what the *owner believes* is fair market value, or the least amount of money that the owner will accept, which can vary widely among different people for the same asset. This is what most people have in mind when they use the term “liquidity.”

Clearly, cash is the most perfectly liquid asset since cash can always be converted to an equivalent amount of cash (wow, talk about an oxymoron). Bonds are fairly close, particularly short-term bonds, that can be sold for amounts close to their face amounts. Long-term bonds, for reasons that we will describe later, **if we have time**, are more subject to substantial price changes. Stocks are generally less liquid than bonds, not because they cannot be sold rapidly, but because the amount they can be sold for is uncertain and their price can vary widely within a short time, although a blue chip stock, such as Ford Motor Company should be considered more liquid than a speculative stock, such as that for a start-up electric car manufacturer. Homes, cars, and collectibles are usually considered quite illiquid since prices of these items can fluctuate quickly, and it may take a great deal of time to find a willing buyer at a price the seller regards as acceptable. Many people resist taking large losses.

3. What functions does money serve?

There are at least four uses for money. The first two are the most relevant for macroeconomics.

A. Medium of Exchange: Economists often refer to this as the *transactions function*. Money is used in exchange for almost any good and or service that is for sale. It makes possible specialization, trade, and without it, modern economies would not thrive. They would be reduced to inefficient barter systems, one small step removed from self-sufficient farming.

B. Store of Value: Economists often refer to this as the *asset function*. Since money is largely imperishable and maintains its value (except as it may be reduced by inflation), it can be kept in a coffee can or bank account to be used when the owner sees fit. Consider any other goods. Corn, for example. It will last only a few months. Of course, in earlier times, farmers made whiskey from corn which was largely imperishable (and had quite a number of potential users, partly because, unlike much of the water available, it was almost always safe to drink) and so corn whiskey came close to meeting the definition of money at one time in this country. A similar situation existed for cigarettes in some countries after WWII. But most goods will depreciate in value/quality over time. Those that may not, e.g., diamonds or antiques, are usually not readily marketable at a known or fair market price. Keynes put increased emphasis on money as an asset that people wish to keep and successfully argued that people will not be anxious, in fact would often be unwilling, to invest or loan their money savings at low rates of return. The *asset use of money* is often divided into the *precautionary* demand for money, i.e., money held to take care of contingencies, e.g., if you need to repair your car, or travel to a wedding, or pay tuition, or retire; and the *speculative* demand for money, i.e., money held because you think interest rates will rise and you can get more for lending it at a later time, or because of anticipation that the prices of other goods will fall and your money will buy more later., or simply because you fear to risk using it to purchase less liquid assets, or maybe some people just enjoy having money.

C. Unit of Account: In this function, money serves as the way in which we value of goods and

services. We could easily calculate that a car is worth, say, 15,000 times as much as a loaf of a particular type and brand of bread. But it would sound silly to actually state the price of a car in terms of loaves of bread.

D. *Standard of Deferred Payment*: Money is used to specify the future amount of a debt that must be repaid.

I think that both the unit of account and standard of deferred payment functions could be considered variations of the medium of exchange/transactions functions since both are incurred in order to obtain goods and/or services.

4. What are commercial banks and what are their functions?

Commercial banks and many other financial intermediaries serve two main functions:

A. They facilitate, through checking and/or other types of deposits, your purchases of goods and services. Typically, people will put their paycheck in the bank and use checks (or credit cards) to buy groceries, pay rent, pay utilities, etc. It is largely a matter of convenience. Few people want to carry around cash sufficient to pay for all of these expenditures, and it is undeniably convenient to simply mail a check (or transfer funds using credit cards (or the internet) rather than travel to every site to which you owe money to make a payment. Isn't modern technology wonderful?

B. They facilitate the transfer of savings from savers to investors. Most of you, even if you regularly save part of your income, will not be able to make a large investment or purchase an expensive consumption item, such as a car or house based on your savings alone. So, many people put their usually small weekly or monthly savings in a commercial bank or other financial intermediary which will in turn lend your money, and the savings of others, to a borrower who needs a large amount for investment, or to purchase a car, or a house, or a large appliance, etc. You may leave some funds in a checking account (for convenience) and the remainder of funds you may place in an interest bearing savings account, The bank gains by the difference its operating costs and interest it pays to account holders and what it earns from borrowers. In either case, the bank serves as the *financial intermediary* between savers and borrowers

Commercial banks are *usually* defined as those financial intermediaries that are licensed to enable depositors to write checks on their accounts (identified as demand or checking deposits). Most commercial banks are privately owned. Credit unions, however, which are nonprofit cooperatives, also frequently allow checks to be written and are equivalent to commercial banks. There are other types of institutions that offer to pay interest on savings accounts, e.g., savings and loan associations, mutual savings associations, that are also regarded as financial intermediaries. Prior to 1980, these institutions could not provide checking services. However, this restriction was changed in 1980 and now many do offer checking services. Note that commercial banks also collect money from savers by offering savings deposits and their close relative, c.d.s in addition to checking deposits.

Please distinguish financial intermediaries that maintain savings at a fixed monetary value from organizations such as hedge funds, investment banks, mutual funds, etc. In these organizations, you basically buy a share of a portfolio of assets and prosper according to whether these assets gain or lose in value.

Aside: Banks are heavily regulated. There are many institutions, collectively referred to a *shadow*

banking that engage in channeling money from savers to borrowers but are unregulated because they do not accept traditional bank deposits. Examples are investment banks, mutual funds, hedge funds, etc. However, they still use the banking system to store money and channel money to borrowers.

Back to commercial banks. Some years ago, a sharp distinction was made between demand deposits (then always non-interest bearing) and savings accounts (interest bearing), both of which are fixed in terms of dollars. However, this distinction is rapidly blurring as some checking accounts pay small amounts of interest and some financial intermediaries are finding innovative ways to enable savings deposits to function almost like checking accounts, e.g., funds are automatically transferred from a savings deposit to a checking deposit if a customer's funds in a checking account are inadequate to cover a check. There are currently a growing number of types of checking and saving accounts, as banks compete for customers and the nice and neat distinctions of yesteryear are becoming increasingly blurred.

The origin of banks: Many centuries ago, so the story goes, before commercial banks were developed, people would bring money/gold to goldsmiths for safekeeping as goldsmiths usually had a safe place to store money/gold and other precious items. It soon became apparent to the goldsmiths that at any one point in time, only a *small* portion of this money/gold would be withdrawn. This led to the custom of making loans with part of the funds that people had deposited there, and this eventually led to the institution of banking which performs the identical function. This is the most common explanation, but there are other explanations for the origin of banking.

During the early years of this country, many banks were formed, some of which were well managed, and some of which were not. Many issued their own currency, most of which was quickly discounted by people in other parts of the country and much of which became worthless. In principle, the currency and deposits at the bank could be redeemed for its equivalent value in gold. However, banks frequently did not have enough gold on hand to redeem all of the currency and deposits that they had outstanding. If and when people lost confidence in the ability of the banks to redeem their currency in gold or to allow people to redeem their deposits, it would often precipitate a run on the bank by people anxious to redeem their currency or withdraw their money (in gold) before the bank went under, a request that banks could rarely accommodate since most of the money was out on loan. In consequence, the bank would fail and some people would lose their money.

The country went through several cycles of bank failures and finally, in 1933, Congress created the **Federal Deposit Insurance Corporation (FDIC)** which ensured that depositors would be reimbursed in case of bank failure if they deposited their money in a bank that chose to pay the FDIC premium and met standards set by the FDIC. Originally, up to \$100,000 per depositor could be reimbursed. This amount was increased to \$250,000 during the recent great recession, to encourage people *not* to withdraw funds in a time of financial instability. The following categories of accounts are eligible for reimbursement in case of bank failure:

- * **Checking accounts and Negotiable Orders of Withdrawal**, also called NOW accounts (checking accounts that earn interest, usually in teeny amounts).
- * **Savings accounts** that you can add to or withdraw from at any time. They used to be called time deposits since they sometimes required the money to be left for a short time (say two months) before it could be withdrawn, sort of like a very short term CD.
- * **Money Market Deposit Accounts**, also called MMDAs (savings accounts that allow a limited

number of checks to be written each month.) See how blurry the old distinctions are becoming.

* **Certificates of deposit** (CDs), which require you not to withdraw funds for a set period - generally until maturity - in return for a fixed interest rate.

Note that you can be insured for *more* than \$250,000 by maintaining accounts in different banks since it is the individual account, not the individual that is insured. Not all banks belong to the FDIC. If they do, they must pay premiums and meet bookkeeping and solvency standards. If they do not, take your money out of them.

5. What are current ways of measuring the money supply?

There are two different ways that the Federal Reserve measures the money supply.

A. *M1*. This is the conventional and for many years the only measure of the money supply. It includes currency and coins in circulation (*nota bene -not in bank vaults*), demand i.e., (checking) deposits, Negotiable Order of Withdrawal Accounts (NOW accounts, basically interest bearing checking accounts), Automatic Transfer Service Accounts (ATS accounts, basically these accounts transfer funds from a savings account to a checking account when needed to cover a check), and travelers checks (which are, if anything, more widely accepted than checks). During December 2019, the supply of M1 was about \$4,059.2 billion., over \$4.0 trillion (not seasonally adjusted), . M1 is the measure of types of money that is most likely to be used as a *medium of exchange*, about half of which is cash, and the other half is demand deposits or travelers checks

B. *M2*: During the 1960s, it became clear to most economists that the supply of savings deposits in commercial banks, and other financial intermediaries was rapidly growing. More importantly, these deposits greatly *reduced* the need for M1 in its function as a store of value (asset function) since they were just as secure and paid interest to boot. Thus, the Federal Reserve developed M2, which is a broader definition of the money supply. M2 includes:

- *all* of M1
- all savings deposits
- small denomination certificates of deposit (CDs) less than \$100,000 and a few other miscellaneous types of accounts that I do not expect you to remember

This measure of M2 was considered essential to an understanding of the money supply since many people who hold savings deposits would keep some of this money in demand deposits if savings deposits were not available. Although savings deposits cannot usually be spent directly (although the banking system is making it easier and easier to do so), these deposits are, for the most part, instantly available to the depositor at stated and known values (thus, for all practical purposes, are *perfectly liquid*). Savings deposits used to have a provision that, at the banks discretion, funds could require a 60 day notice before withdrawal (perhaps to protect the bank in case of a run on the bank). However, I have never heard of this being enforced. CDs do impose some restriction on how quickly they can be withdrawn and are sometimes referred to as time deposits. Typically, they carry a higher rate of interest than savings deposits..

During December 2019, M2 equaled about \$15,494.7 billion, or almost \$15.5 trillion (not seasonally adjusted), far larger than M1 alone, indicating the importance of the asset function of money (savings deposits are typically used to **safely** accumulate savings). About 70% of M2 was maintained by commercial banks and the remainder by other thrift institutions (e.g., savings and loan associations). The money supply rose

substantially in recent years partly mostly in an effort to reduce unemployment created by the great recession (see below). More recently primarily to keep the economy booming.

6. Why aren't credit cards considered as money?

Most of you probably have credit cards which are increasingly used in lieu of carrying cash around or writing checks for each purchase. Nevertheless, economists have never considered the availability of credit cards as part of the money supply. The reasoning is that credit card debt is considered a short term loan, and not part of the money supply. I am uncomfortable about not regarding the use of credit as part of the money supply.

Consider, economists developed M2, because the existence of savings accounts greatly reduced the need for, and the demand for, M1. But doesn't the use of credit cards have the same effect of reducing the need for cash or the amount of money in checking accounts. Many people use their credit cards as the equivalent of, and in lieu of, checks and cash. In fact, if credit cards did not exist, people would write many more checks than they currently do and correspondingly maintain more M1 and probably M2.

*Optional? Think of it this way. Suppose a family spends \$4500 a month, an average of roughly \$150 per day. If their initial budget is \$4500 and is gradually drawn down during the month, the **average** amount of money held by the family is \$2,250 during the month. But suppose the family charges all purchases during the month, and then makes one lump sum payment **on payday** at the beginning of the month. No cash was needed during the month, so the average amount of money per day held by the family is only \$150 (i.e., \$4500/30). This obviously greatly reduces the amount of cash or checking deposits needed for transactions purposes. Of course, real life is not this smooth, but over large numbers of persons, the rough conclusions of this back of the envelop analysis will probably hold up.*

I suspect, if I were to talk to the individuals who define M1 and M2, I would find that the major problem in considering credit cards as part of the money supply is that they do not know how to quantify the amount of credit that should be counted as money.

Nonetheless, it is obvious that the use of credit cards has important effects on the demand for, and supply of, money. Economists usually regard the effect of credit cards as increasing the velocity of money (remember, classical economists thought the velocity of money was relatively stable, but people did not have credit cards in those days).

7. What are international reserve currencies? Most countries throughout the world have their own currency. However, the stability and general international acceptability of the money of most of these countries is quite limited. However, there are several currencies that are widely traded and considered reasonably stable, e.g., the dollar, the yen, the pound, the euro, and, since October 2016, the Chinese Yuan, with the dollar the most prominent although this may not last forever. These are termed **international reserve currencies**. Many countries **and** large businesses maintain deposits denominated in one or more of these international reserve currencies and make international payments from these accounts since these currencies are accepted by many, probably most, organizations involved in international commerce. These reserve currencies can easily be converted into their own currencies, or used to settle international debts. The growth of globalization obviously accelerates this use of international reserve currencies. It might be useful to think of the U.S. dollar as a world currency since few people would hesitate to accept it in payment of a debt.

It is interesting to note that countries that maintain accounts in these reserve currencies are basically subsidizing the issuing countries. In order to build up their accounts, these countries, frequently poor, must earn these currencies in order to hold them, and this means they must sell real goods and/or services to rich countries, and receive nothing in return but the possibility of someday buying real goods and services with the currency and bank deposits they earned and held.

8. How is money created - the simple model? Fractional Reserve Banking

The easy way: Of course, one way is simply to print it, and some countries have done so. Did you ever hear the expression, "it isn't worth a continental." This originated during the American revolutionary war. The following is quoted from an article on the internet.

Because the Continental Congress was unable to levy taxes to pay for the war, it relied on the printing press to issue nearly \$250 million in paper money (the so-called Continental). The paper money was backed only by the good faith of the Congress; because of dislocations in trade and manufacturing, there was too much money competing for too few goods. The result was uncontrolled inflation. In early 1780, the Congress confessed that its money was worthless (something the people had known long before as evidenced in their popular saying "not worth a Continental").

A pair of shoes was reputed to cost \$5,000 continental dollars.

Although it is quite possible for any country to print money, this is really not important for monetary policy unless a country prints too much money. What is important is how the banking system operates to create money. This has struck more than one person as akin to *magic*, a worthy companion to the *magic* of the multiplier.

A simple model of bank creation of money - How the fractional reserve system works: The following very simple model describes **how banks can create money, even without** a central banking system. In this **very simple** model, **assume** that all money is based on a finite supply of gold coins (the gold standard which existed in many countries for centuries).

Step 1: Banks **must** have bank reserves, which are also sometimes called high powered money. Bank reserves consist of **only** that supply of an asset designated as money (i.e., gold in this **simple** model) that banks **hold in their vaults (Remember** that vault cash is **not counted** as part of the money supply which is a little confusing but bear with me). **Later**, when we discuss central banking, high powered money/bank reserves will be defined as money banks hold in their vaults (usually paper money, not gold) **or as deposits by commercial banks in the central bank**. Remember, M1 and M2 refers only to the money held/ or owned by the **nonbank** public. Paper and metallic money held in bank vaults is **not** counted in either version of the money supply, but **is** regarded as **part of bank reserves** (or high powered money). Please try not to be confused by this terminology. In this simple model, we will discuss **only** the creation of money counted in M1.

For the moment, accept the premise that only gold coins can be used as bank reserves, i.e., money held in a bank vault. Remember that coins **not deposited** in a bank do **not** constitute bank reserves. Also, remember that we are assuming that there is no central bank in this simple model. Basically, this is how the gold standard worked.

Now, let us assume the government mints and spends \$100,000 in new gold coins and spends them **creating an additional \$100,000 in the amount of money**. People who receive these coins place them in a secure location for safekeeping and let us accept that that secure location is a deposit in a bank. Since these coins are initially held by the banks *in their vaults*, **these coins are** bank reserves and are **not** part of M1 (or M2). There is **no immediate change in M1**, however, as the depositors now have \$100,000 in checking deposits instead of gold coins.

Let us assume for teaching purposes that initially a single bank has all of this \$100,000 in coins deposited for safe keeping.

Step two: Determine what percentage that the bank feels it must keep as reserves, i.e., the money that the bank retains in its vaults in case some of the depositors withdraw some of their funds.. Assume that the bank knows, from long experience, that at any point in time, only a few people will withdraw money for other uses. Let us further assume that the bank feels that as long as it has 10% of these deposits on hand to accommodate withdrawals, it can meet its banking responsibilities. That means that the bank feels that it **must keep** \$10,000 in its vaults as reserves in case depositors wish to withdraw some of their money.

Step three: Make loans. After allowing a **needed reserve** of \$10,000, the bank has \$90,000 of **excess reserves** that it can lend out and make interest on. If it couldn't do this, it would probably have to charge depositors a fee for keeping their money safe. The bank then makes a total of \$90,000 in loans.

***What has happened to the supply of money?** The original depositors still have their \$100,000 in checking (demand) deposits, which they regard as money, and the people to whom the money was lent now have \$90,000 in coins. The increase in the money supply is now \$190,000, i.e., the original \$100,000 in deposits and the additional \$90,000 in gold coins now in circulation. Remember, the money supply is defined as demand deposits and **currency in circulation**. Try not to become confused between the money supply, and bank reserves.*

Step 4: Most of the people to whom the coins were lent will spend them and the recipients will redeposit this money in a bank. Now the process *repeats* itself. The banks that receive these deposits will maintain a 10% reserve for this \$90,000 in new deposits and so will feel free to loan out \$81,000.

***Now what has happened to the money supply?** It has further increased by \$81,000. The total increase in the money supply is now \$100,000 from the original demand deposits, plus another \$90,000 from the creation of new demand deposits as the lent out gold coins are redeposited., plus \$81,000 in gold coins that was lent out, or \$271,000. This is the amount that people have deposited in checking accounts or hold as gold coins.*

Step 5: Keep repeating this process. People will continually redeposit the money that they receive as a result of bank loans in their own bank. These banks, in turn, will continue to maintain a reserve of 10% and then lend the excess (always described as **excess reserves**). The process will continue on, *ad infinitum*, (this should remind you of the multiplier).

Like the logic underlying the multiplier, this process of lending and redepositing sets in motion an infinitely long, but declining, series of deposits and loans. Of course, perhaps some people will choose to maintain some coins in their pocket reducing the amount that is returned to the bank, but in order to simplify the model, we assume that this does not occur.¹

Given this assumption, the *deposit expansion multiplier* will, if a sufficiently long time is allowed, cause money to increase by a multiple of the original increase in gold that can be used as bank reserves, i.e., the newly minted coins (assuming of course that borrowers can be found). This multiple is calculated by dividing 1 by the percentage reserve maintained by the banking system. In this simple model, it is $1/.1$, or 10. This formula is defined as the *money multiplier*. Eventually, the entire \$100,000 of new coins will be deposited in banks and used by the banking system as reserves for the deposits that they owe and the money supply will increase by \$1 million (i.e., $(1/.1) \times \$100,000$). Note that our estimate of a 10% reserve is arbitrary. Banks could maintain a higher percentage reserve if they feared for the future, or a lower reserve if they were optimistic about the future and were not restricted by Federal law. . Now you see why it is called the fractional reserve system

Understand this process as follows. Each time a loan is made in this simple model, gold coins are distributed to the borrowers and the money supply is increased as the bank still owes money, i.e., demand deposits, to the depositors of the gold coins. Eventually, all of the coins are held as high powered reserves in bank vaults and the money supply consists only of deposits at banks that are subject to periodic withdrawal. This is how the gold standard (no longer used) set a limit on the amount of money that can be created, and limited inflationary pressures.

Few people understand this process. Bankers themselves, if asked how they create money will often respond that they do *not*. They argue that they only lend out money that people deposit there. In fact, they are correct. It is *not the individual bank*, but the *banking system as a whole* that makes the creation of money possible.

The following is extra, and will not be discussed in class nor will you be held responsible for knowing it.

If we let R equal the increase in high powered reserve money and r represent the percentage of deposits that banks feel that they must maintain as reserves, the formula looks as follows: $M = R + (r)R + (r)^2R + (r)^3R + \dots + (r)^nR$. The solution to this formula is R/r and the multiplier is $1/r$.

If anyone wishes to see the solution to verify that the money multiplier is $1/r$, let me know.

The above model is exactly the model described in the text.

The critical point: The hard thing to grasp about this process is the *unique* position of *commercial*

¹It is only a slight complication. Basically, the amount available for lending after each round would be the amount left over after the amount needed for reserves is set aside, and the amount that people keep as pocket cash, is subtracted.

banks. Your first impulse is probably to wonder how banks can keep lending the *same* money time and time again. The reason is that the money *rarely leaves* the commercial banking system. It, of course, leaves the bank which makes a loan, but is promptly *redeposited* into *another* commercial bank. The banking system controls the payments mechanism for the economy.

Note that in the process of expanding loans in response to the influx of bank reserves, the banking system is also increasing the demand for goods and services which in turn will lead to greater output or higher prices or some combination thereof.

Now let us describe modern banking systems and how money is created with central banking.

9. What is the central bank in the U.S and what are its functions?

Central banking in the U.S. takes place through the Federal Reserve system, commonly known as the *Fed*. Burn this term, **the Fed**, in your memory. The Federal Reserve system manages the money supply in the entire U.S., and actually determines how much money (and high powered bank reserves) can be created. The Federal Reserve system has primary control over the level of lendable funds available to the banking system and can strongly influence the level of interest rates, and by controlling these variables plays an important role in stabilization policy today in the U.S.

Note that all modern economies maintain a central bank or a central bank system. Although the central banks of different countries have some differences in the way they are organized, in general, they maintain deposit accounts for the commercial banks and perform the same activities as in the United States.

11. What is the structure of Federal Reserve System?

The Federal Reserve System in the United States was created in 1913 after repeated bank crises convinced Congress that a central banking system was needed to regulate banks and the money supply. The Federal Reserve System consists of 12 district banks designed to serve 12 different regions in the country. These banks serve as *banker's banks*. Just as you maintain deposits in your local bank, most local/commercial banks maintain deposits in a regional federal reserve bank. These commercial bank deposits, along with any cash they have in their vault, serve as *bank reserves* against the amount of checking and other deposits that the commercial banks are responsible for. Note that the concept of bank reserves/high powered money, has been expanded to include *both* vault cash *and deposits at the Fed*.

12. How is the Federal Reserve System managed?

The system is managed by a Board of Governors consisting of 7 individuals, each appointed for 14 years by the President and confirmed by the Senate. The most powerful member of the Board is the Chair (note the gender neutral term), who is appointed for a term of 4 years although typically he or she serves for a longer period. Each member of the Board of Governors is limited to one term, but may serve longer than 14 years if initially appointed to complete an unexpired term. The current and last four chairpersons are:

Jerome H. Powell	Lawyer appointed 2018
Janet Yellen	Economist 2014- 2018
Ben Bernanke	Economist, 2006 - 2014

Alan Greenspan Economist, 1987-2006

Paul Volcker, Economist, 1979-87

The expectation was that since each member of the Board of Governors would have a tenure lasting through at least 3 and ½ presidential terms, the Federal Reserve would be largely independent of Congress and the President. Note that Bernanke, Volcker, and Greenspan were appointed and reappointed as chairs by both a Republican and Democratic president. Each was appointed for 14 years to the board of governors, but only for four year terms as chairman.

13. What does the Federal Reserve do?

The Federal Reserve carries out many critical functions. 1) It serves as a *clearing house* for member banks so that if a bank has more withdrawals than deposits, the difference is deducted from their account at a Federal Reserve bank and credited to banks that have more deposits than withdrawals. This is just exactly parallel to what happens when you write a check and money is taken from your account and placed in someone else's account. Your account goes down and the other person's account rises. 2) It provides *loans to members banks* when they need to increase their reserves temporarily, just as banks may assist you when you have a temporary need for money. This was particularly important during the recent great recession when Federal Reserve loans enabled a number of important banks to survive (usually banks with sufficient assets to cover their liabilities but who had liquidity problems). 3) It enables banks to make *loans to each other*, just like when you write a check in order to make a loan to a friend. 4) Most importantly, it *manages the nation's money supply* by controlling the amount of bank reserves available to banks, and setting the level of reserves which banks must maintain against deposits. This, in turn, affects interest rates, employment, investment, and GDP.

14. What is a simple balance sheet

It will assist in understanding the U. S. banking system, and other parts of the financial system, to develop an extremely simplified balance sheet for a commercial bank. A balance sheet is based on the obvious observation that the net worth of the bank (or of you) is equal to the value of everything the bank (or you) own minus everything that the bank (or you) owe.

Banks, and other financial institutions take money from one group of individuals and lend the money to another group. They profit because they pay lower rates of interest on their liabilities, i.e., the money they owe, than they receive on their assets, i.e., the money owed them. This is possible because:

- Some people seek safety rather than high returns.
- These institutions provide valuable checking services - remember the transactions function.
- A bank is a place to temporarily place funds before future use and perhaps make a little interest - remember the asset function.
- These institution can bundle small amounts of money from many different people and loan a few people much larger amounts very efficiently .

One other point must be emphasized:

- A large percentage of the money that banks and other financial intermediaries **use** for

investment purposes is typically derived from highly liquid demand and savings deposits and may be quickly withdrawn. However, banks typically make long term, illiquid loans, i.e., assets that are repaid over a lengthy period of time, e.g., 5 year car loans, 40 year home mortgages. Even revolving credit is often repaid slowly.

The following is a simple model of a balance sheet of a typical *commercial bank*. Of course, an actual balance sheet would contain many more items. Remember: **Net Worth = Assets - Liabilities**. You do not need accounting to grasp this intuitively.

ASSETS	LIABILITIES
Vault Cash Deposits at the Federal Reserve Required Reserves Excess Reserves	Deposits Demand/Checking deposits Savings deposits
Commercial Paper	Loans from other banks
Loans Mortgages/derivatives Automobile Credit Card Loans to other banks Other Govt Securities	certificates of deposit
Other assets	Bonds
	EQUITY (Assets minus Liabilities) Common Stock Preferred Stock Retained Earnings

15. What are some causes of the financial meltdown that occurred in 2009 starting the great recession?

But first, I want to remind you that commercial banks are only one of many financial organizations seeking money from depositors/investors. Among these various financial organizations are:

- Savings and Loan banks and Mutual Savings Banks which offer savings deposits usually paying higher interest rates than banks.
- Mutual funds, which sell shares to people and then invests the money. People can redeem these shares, on demand, for their *pro rata* value of the mutual fund at the end of the day.
- Hedge funds, which operate in a way similar to mutual funds although they may have more restrictions on when shares can be redeemed, and often invest in a wider latitude of assets.
- Investment banks, which provide a variety of financial services, including investing in various types of assets, often with borrowed money.

Some financial institutions are heavily regulated, particularly those that obtain funds from depositors who have checking or savings accounts. Other institutions are largely unregulated, generally those that derive funds from large depositors such as hedge funds, investment banks. These unregulated institutions are usually known as the *shadow banking* area of banking. Shadow banking is comparable in size to depository institutions. However, our subsequent discussion will focus on regulated institutions, and primarily the commercial banking sector which offers checking accounts. Even then, our focus will be on the checking account part of their business.

Usually, the initial cause of the financial meltdown, and the recession which began in about 2008, is ascribed to toxic mortgages which led to enormous losses by many financial institutions including large banks that were critical to the national and international economy. How did this come about?

Not too many years ago, home mortgages were usually written by local banks who appraised the value of the home, rated the likelihood that the borrower would retain his or her job and be able to repay the loans, and then either retained the mortgage so that the bank had to bear the cost if the borrower defaulted, or sold the mortgages to larger financial institutions or to semi-public organizations like Fannie Mae and Freddie Mac. In either case, the mortgage application was carefully examined to ensure that the home was not overvalued, and that the borrower was likely to be able to repay the loan. Fannie Mae and Freddie Mac are large quasi-public entities that were established to purchase mortgages from private commercial banks. They serve the purpose of recycling funds back to banks so that they could be lent out again.

Times changed during the 15-20 years prior to 2009..

- Increasing emphasis was placed on extending home mortgages to less creditworthy people, usually persons with low incomes.
- Many mortgages written by local banks were sold to large investment firms and large banks, as well as to Fannie Mae and Freddie Mac. Importantly, the standards used by Fannie Mae and Freddie Mac and the larger financial institutions became much more lenient in a misguided effort to extend home ownership to more people.
- In addition, mortgages began to be issued by private companies (mortgage originators) on behalf of lenders who typically promptly sold them to Fannie Mae, Freddie Mac, or other

investors such as hedge funds or large investment banks. In 2004, it was estimated that about **two-thirds** of all mortgages were originated by a mortgage broker.

These changes distorted the incentives involved in making loans. Mortgage brokers were paid when they completed a mortgage, and sold the mortgage to another institution, after which the mortgage brokers **bore no further responsibility**, creating an incentive to issue subprime loans. Unfortunately, the same incentives also existed for commercial banks if they intended to resell the loans to Fannie Mae or Freddie Mac, or other large institution.

In consequence, mortgage brokers and commercial banks, and other financial intermediaries, **following their rational self interest**, relaxed their standards for issuing loans. Loans began to be issued to persons with a significant credit risk because of low earnings, sporadic earnings, or other negative factors. Sometime, the person requesting the loan, or the person /organization wishing to issue the loan would put down false information about the applicant's earnings in order to qualify them for the loan, intending, of course, to resell the mortgage and shed any financial responsibility for a default by the borrower. Sometimes they would inflate the value of the home in order to increase the size of the mortgage and receive a higher commission.

The housing market boomed. In some cases, people would buy more home than they could afford on the belief that the value of homes would forever continue to rise, a belief sometimes encouraged by the person/organization issuing the loan. These loans were sometimes issued with teaser beginning loan rates, e.g., adjustable rate mortgages (ARMS) that would reset after several years increasing monthly payments to levels that borrowers had not foreseen or understood.

Not all persons were dishonest. Some bankers actually believed that prices of homes would inflate forever (as might be concluded given recent (at the time) historical patterns and some home buyers were literally panicked into buying homes since they feared that if they waited, they would be priced forever out of buying a home. It should also be noted that not all banks engaged in these questionable activities

In any event, increasingly risky mortgage loans were approved by local banks and mortgage originators who themselves bore little risk since they were promptly resold on the secondary market. They had little incentive to assure the quality of the loan.

What happened to the Loans? As noted, many of these loans were purchased on the secondary market, e.g., by Fannie Mae, Freddie Mac, and large financial institutions. These loans were then bundled into large packages of hundreds of loans called derivatives since they derived their value from the mortgages of which they were comprised. These derivatives were sometimes called by other names, e.g., mortgage backed securities (MBOs).

At that point, the financial shenanigans became complex. These bundled securities were often given high ratings by rating organizations, such as Moodys, Standard and Poors, and Fitch (**which survived by selling rating services to banks, so what would you expect**), and these derivatives were sold throughout the world, causing banks all over the world to be dependent on the continuing boom in the U.S. housing market)

Of course, many of the buyers of these derivatives knew they had significant risk. In consequence, they began to insure these derivatives against a decline in value. The instruments which insured the

derivatives were given another obscure title “credit default swaps.” I guess it means that if the people who owed the mortgages were unable (or unwilling) to pay (credit default), then somebody else would bear the risk (the swap).

Aside: almost unbelievably, you did not have to own a derivative to purchase a credit default swap. In consequence, multiple credit default swaps could be sold insuring the same derivative. This would be comparable to you buying car insurance, and then several neighbors on your street also buying the same policy. The neighbors, in effect, would be betting that you might have an accident and the insurance company would pay all holders of insurance policies purchased on your automobile. If the above looks complicated, believe me, some financial organizations, seeking greater profits (rational self interest) created and sold extremely complex securities which were sold to unsuspecting buyers, who sometimes/often had a limited understanding of the risks involved.

What went wrong? They system worked great as long as housing prices kept rising. Even if a borrower defaulted, the repossessed home could be resold and the mortgage paid off. Unfortunately, and I suppose inevitably, starting about 2008, some homeowners began to default on their mortgages. Further Investigation discovered that many existing mortgages were at high risk of defaulting and were identified as “toxic.” Some subprime borrowers were unable to continue paying their mortgages, particularly when interest rates were reset to higher levels because the mortgage was originally issued as an adjustable rate mortgage (ARM) with a low teaser beginning interest rate. Other homeowners fell victim to rising unemployment. Housing prices began to fall and , the homes could not be resold for amounts that would even cover the mortgage levels, i.e., the owners were “underwater.”

In consequence, the value of the derivatives began to fall and banks (and other organizations , such as institutions which insured these mortgages) began to have serious problems.

Optional: Let us consider Lehman Brothers. At the end of February, 2008, Lehman brothers had \$786 billion in assets of which \$695 billion was in long term investments, a substantial amount of which was in mortgages that Lehman Brothers had intended to sell to other investors, but was unable to sell because of a drop in the value of housing.

At the same time, Lehman Brothers had total Liabilities of \$761 billion, On paper, it looked as if their assets exceeded their liabilities.

Four problems:

- *Some of their long term assets were mortgages with an unknown value, but considerably less than the amount that was being carried on the books. When Lehman brothers was finally liquidated, these assets were sold at extremely low prices, sometimes 10 cents on the dollar.*
- *Some of their liabilities were short-term borrowed money such as a C.D.s (some of which was used to acquire the mortgages) that had to be paid in cash as they came..*
- *Because of the decline in their ability to sell the mortgages, earnings at Lehman dropped sharply, in fact, Lehman brothers lost \$3.4 billion in the first 6 months of 2008.*

- *In consequence, Lehman brothers was unable to meet current operating expenses.*
 - *Investors who lent Lehman Brothers money were no longer willing to continue lending to a company whose assets were feared to have a market value much less than their liabilities.*
 - *Inevitably, Lehman Brothers was forced to declare bankruptcy setting off the great recession*
-

Consider the American Insurance Group (AIG). AIG insured billions of dollars of mortgages with credit default swaps, at a very low cost for the swaps. While the housing market was rising, AIG earned a great deal of money without having to pay out anything. But when the housing market declined, then the holders of the credit default swaps began to fear that AIG did not have enough cash to cover the losses. In fact, the value of mortgages comprising the derivatives fell and AIG had insufficient resources to cover its credit default swap commitments. AIG was a major insurer of banks around the world. If AIG collapsed some major banks around the world would be forced into bankruptcy. This would lead to massive turmoil, as depositors and investors began to withdraw funds from banks, and banks themselves would be forced to restrict or stop lending and begin to liquidate their assets, typically at bargain basement prices. Basically, this was the reason for the AIG bailout by the Federal Reserve. With respect to AIG, it should be noted that the assets of AIG exceeded their liabilities, but a large percentage of these assets were in illiquid assets leading to a cash flow problem which was met by the provision of federal reserve loans. Note that eventually these loans were repaid with a profit to the government.

Now, consider commercial banks.

- The value of bank assets, especially those of large banks which owned derivatives ***declined dramatically***, as the value of derivatives and toxic mortgages fell. The decline was made worse by the fact that the government began to require that banks value their assets at market value (the technical term is “mark to market”) rather than the actual value of the loans even though some banks felt that this understated their actual value.
- At the same time, the value of what they owed, mostly checking, savings deposits, and CDs did not decline in value.
- In consequence, some banks owed more than their assets were worth and were labeled “Zombie banks.” Some banks failed.

The net effect of the problems that we have described was to dry up lending markets so that many business could not obtain funds needed for operations (e.g., payroll, supplies) and had to curtail or limit their business, and many people could not obtain loans to purchase houses, cars, etc. As lending fell aggregate demand/aggregate expenditures fell, and unemployment began to rise. This set in a cascade of negative events. Higher unemployment meant further falls in aggregate expenditures and led to a negative multiplier effect. This, in turn, began to create more problems in housing as unemployed workers could not pay mortgages. Expectations about economic stability/prosperity began to decline, further reducing peoples' willingness to spend and accelerating the negative multiplier effect. A major shakeout was created in the automobile industry. These effects spread throughout the world which largely blamed the U.S. for the

worsening recession, although banks in some other countries were far from blameless.

You can visualize what was happening by looking at our simple bank balance sheet. On the asset side, the market value of loans for mortgages, automobiles and credit cards declined, sometimes drastically. But the value of bank liabilities, e.g., checking and savings deposits, c.d.s., loans from other banks remained unchanged.

To relate all of this to our earlier discussions of AD/AS, the seizing up of credit is equivalent to causing the AS curve to shift upwards as credit becomes more expensive or unavailable, driving up business costs and in some cases causing business to be unable to continue their operations. The AD curve shifted to the left as people purchased less due to rising unemployment and fear, and were less able to borrow money to purchase homes, automobiles, and other goods. As increasing numbers of people became unemployed due to a negative multiplier, the AD curve continued to shift to the left.

Optional: The following remedies adopted by the government to reduce these adverse effects and help us climb out of recession, all of which were, and are, controversial:

- *Helping a few delinquent borrowers stay in their homes by lowering interest rates and modifying a few mortgages.*
- *Increasing the amount of a bank deposit that is insured by the FDIC from \$100,000 to \$250,000 so that depositors will be less likely to withdraw their funds from a bank feared to be in trouble (this was one of the first steps taken).*
- *The Treasury purchased preferred stock in some banks, increasing the capital of these banks (known as recapitalization) and increasing the amount of lendable funds that these banks had available). Consider the balance sheet. If the Treasury purchases \$1 million in preferred shares, then the equity account will grow by \$1 million in preferred shares and the amount of excess reserves will grow by \$1 million which will both increase the funds that the bank has available for lending, and reduce the amount by which the bank is insolvent by the same amount. (The original purpose of the TARP bailout funds was to purchase some of the toxic assets held by banks, but this was changed in favor of buying preferred shares. Contrary to the beliefs of many,, the Treasury received a significant return on these expenditures.*

16. How does the Fed influence/control bank lending?

The banking system of the U.S. operates in much the same way to create money as the simple banking system based on gold coins that was described above. The difference is that **bank reserves**, i.e., **money that can be used as reserves to support demand/checking deposits** includes not only cash that a bank has in its vault, but also the **monetary deposits (not gold) that banks maintain with the Fed**. Not all banks belong to the Fed. Nonmember banks, however, must also maintain the same level of reserves that member banks do, either directly at the Fed, or indirectly through another bank.

As we have repeatedly stated, banks can **only lend excess reserves**. Imagine, if a bank that belonged to the Federal Reserve had \$100,000 in deposits held by the public and the reserve requirement was 20%, then it **must** maintain \$20,000 either in its vaults **or** in the Federal Reserve. If in fact, the bank had a total of

\$30,000 in these two locations, it would have \$10,000 in excess reserves which it could lend. What has happened to the other \$70,000 that was deposited in checking accounts? Think. It has been loaned out.

The Fed controls the money system, including the availability of lendable funds and ultimately the interest rate largely by the methods described below. Monetary policy is based on the ability of the Fed to either increase (to fight unemployment) or decrease (to fight inflation) lending by the vast majority of financial intermediaries.

17. How does the Fed influence/control the money supply/bank lending?

17A. Reserve Requirement: The Fed sets the requirement for the percentage of bank reserves (vault cash plus Federal Reserve deposits) that banks must have available as reserves against their demand/checking deposits (currently there are no reserve requirements for savings deposits)

Assume that the Federal Reserve wishes to expand the money supply, lower interest rates and increase lending. One way to do this is to lower the reserve requirement. To illustrate, suppose that there is \$1 billion in deposits held at the Fed by the banking system and in bank vaults (obviously, the actual amount is vastly larger, but this will keep the numbers in the example smaller). If the banking system is fully loaned up and the reserve requirement is .2, then the banking system could have a maximum of \$5 billion in checking deposits (.2 times \$5 billion = \$1 billion, the amount held at the Fed and/or in bank vaults. Alternatively, remembering the money multiplier, \$1 billion times $1/.2 = \$1 \text{ billion times } 5 = \5 billion .

But suppose the Fed *reduces* the reserve requirement from 20% to 10%. Then the banking system would be required to maintain only \$.5 billion in reserves against the existing \$5 billion in deposits. It now has \$.5 billion in excess reserves against which loans can once again be made. Now, assuming that banks are anxious to put excess funds to work, they would lend out this \$.5 billion, and probably lower interest rates to encourage people to borrow. As the lent money is withdrawn from the lending banks and spent, the recipients would deposit the proceeds in other banks. These banks would present these checks to the Fed which would debit the accounts of the banks making the loans and credit the banks to which the accounts are switched. These bank, in turn, would/could lend \$450 million (remember the reduced reserve requirement of 10%) and the process would continue *ad infinitum* until the banking system was fully loaned up. This is exactly the same process as was explained for the very simple banking system described above (*sans gold*) Ultimately, the banking system would be able to support \$10 billion in checking deposits assuming that there is \$1 billion in high powered money and a .10 reserve requirement. You should readily recognize \$10 billion as \$1B divided by $1/.1$. Remember the money multiplier is equal to $1/r$ where r equals the reserve requirement).

Look back at the model bank balance sheet (page 11). If the reserve requirement is reduced, total reserves would be *unchanged*, but the required reserves would initially decline and the excess reserves would rise. As loans are increased, the level of required reserves would rise, and the level of excess reserves would fall.

You might wonder how this process really works. At any point in time, thousands of checks are being written, each of which theoretically has the effect of transferring funds held at the fed from one commercial bank to another. Actually, in almost all cases, there is a local daily clearinghouse which

determines the net effect on a bank's reserves and only that net amount is actually transferred among banks at the end of the day. Not all checks are cleared on a daily basis since some are not submitted to a clearing house for several days after they are deposited, especially if they must be transmitted between cities. In earlier times it could take a substantial period of time, over a week, before a check was cleared, but this time interval has been greatly reduced. However, the time required to clear a check will sometimes affect you. If you deposit a check, sometimes the bank will not release the funds until after the check is cleared.

Lets take the opposite situation. Suppose the Fed wished to reduce the money supply, and reduce the amount of lendable funds and raise interest rates. Once again, suppose there are available bank reserves of \$1 billion, and suppose the reserve requirement is .1. Then, the amount of deposits that could be created by the banking system would be \$10 billion.

But suppose the Fed suddenly raised the reserve requirement to .2. Then banks would clearly be deficient in the amount of reserves that they possessed by \$5 billion. Borrowers would continue to write checks on their deposits to banks to repay loans. But, the banks, having insufficient reserves, would be unable to make new loans. As the old loans were repaid, demand deposits would decline, but no new ones would be created by making loans because the banks lack excess reserves. The decline in bank deposits would continue as loans were repaid until banks had only \$5 billion in checking deposits which the \$1 billion in bank reserves would support, given the reserve requirement of .2. Interest rates would rise as customers competed for loans.

Note that throughout these changes in the money supply, the amount of bank reserves does not change, only the amount of checking deposits that these bank reserves will support given the reserve requirement.

Changing reserve requirements would appear to be a very valuable tool. However, it is **rarely** used. The major reason is that banks differ in the reserves that they have. If a bank had excess reserves, then raising or lowering the reserve requirement would have no effect on that bank. However changing reserve requirements can be highly disruptive to banks that have no excess reserves..

Just to satisfy your curiosity, the Fed requires a reserve requirement of 10% for banks with deposits of \$45.8 million or more. Prior to 1980, only banks that were members of the Fed were subject to reserve requirements set by the Fed. In 1980, congress passed the **Depository Institutions Deregulation and Monetary Control Act of 1980** which required all banks, whether members of the Fed or not, to maintain the level of reserves set by the Fed.

17B. A second way that the Fed controls the money supply is by setting the discount rate.

If banks run into temporary problems (e.g., in maintaining the required level of required reserves), they have the option of supplementing these reserves by ***borrowing directly from the Federal Reserve***. This will increase their deposits with the Fed in exchange for the bank's promise to repay the loan. The ***discount rate is basically the rate of interest charged to the bank*** by the federal reserve.. Obviously, the higher the discount rate, the more that banks are discouraged from borrowing from the Fed and the lower the discount rate, the more that banks are encouraged to borrow from the Fed. Note that banks that borrow from the Fed are actually increasing the amount of their deposits/reserves at the Fed. In theory they could borrow additional reserves from the Fed and increase lending.

Actually, banks that are seeking to increase the amount of bank reserves that they control are more inclined to borrow from other banks that have excess reserves that they have not lent. The interest they pay to other banks is called the *federal funds* rate which you **must** be able to distinguish from the *discount rate*. Sometimes banks will borrow from other banks for as short a period as one day. Although you will sometimes read that the Fed sets the federal funds rate, this is **incorrect**. The federal funds rate is determined through supply and demand for the excess reserve funds owned by commercial banks. The Fed will sometimes announce a *target* for the federal funds rate which it then influences by open market operations which will be described immediately below. Unfortunately the financial pages often report this as if the Fed actually set the rate.

The discount rate is always set higher than the federal funds rate, which discourages borrowing from the Fed and encourages borrowing from other banks. Nonetheless, banks sometimes borrow directly from the Fed if they are in temporary reserve difficulties, or if opportunities for making loans are good, and banks wish to increase the loans they make, or if they are unable to borrow from other banks (as happened in the recent great recession) Normally, the Fed requires that only government securities (usually short term) are eligible collateral for banks seeking to borrow from the Fed, but during the great recession that started in 2008, and the resulting liquidity crisis, the Fed accepted other high quality collateral, e.g., commercial paper (short term notes issued by private companies), and mortgages that are likely to be paid.

In principle, if the discount rate is lowered, and outside loan prospects are good, there would be an incentive to borrow money from the Fed, which will increase their account at the Fed, and give them excess reserves which they can loan. Conversely, if the discount rate is increased, it will discourage such borrowing, and reduce reserves, lending, and the money supply

However, the discount rate is not usually a major factor in monetary policy. It provides emergency sources of funds for banks. But its main use is to *signal the financial community* as to whether a more lenient, or a stronger, monetary policy is to be expected, i.e., whether the Fed expects to expand or restrict the money supply through open market operations.

Go back to our model balance sheet (page 11). If a bank makes a short term loan at the discount window, then deposits/reserves held at the Fed would rise, and liabilities owed to the Fed by the bank would rise..

17C. The most important way that the Fed manages the money supply is through open market operations.

You often read that the Fed intends to set the Federal Funds rate at a certain level. This is misleading. As noted above, the Federal Funds rate is the rate that banks charge one another for short-term borrowing among themselves. This rate is set by the *supply of, and the demand for*, excess reserves. What the Fed means when it announces a change in the federal funds rate is that it is changing the *target* for the interest rate that banks will charge each other for borrowing money for very short periods, often no more than a day. The Fed affects this rate by *changing the level of reserves* held at the Fed by the banking system through *open market operations*. Open market operations are conducted as follows:

a) Suppose the Fed decides that it needs to increase the money supply, increase lendable funds, lower interest rates and, as a hoped for result, increase aggregate expenditures/aggregate demand, GDP, and employment. It does this primarily by open market operations, usually by *buying* short-term, U.S.

government securities. This is made possible because of the enormous U.S. Debt.

During the recent great recession, the Fed purchased many short term securities increasing the supply of excess reserves to such an extent that short term interest rates fell about as low as possible, even falling below zero in several (very rare) instances. However, these very low interest rates made it virtually impossible to further stimulate the economy by purchasing short term securities. In consequence, the Fed developed a new tactic for open market operation. Instead of buying more short term securities, the Fed began purchasing long-term securities, both U.S. bonds, and high quality private securities, including some mortgages), a process termed *quantitative easing*. It was hoped that by focusing on long term securities, this will further decrease the long-term interest rate and encourage investment and other borrowing. Usually, open market operations have their greatest effect on short term interest rates. During 2014, the Fed terminated the quantitative easing program and the purchase of U.S securities as the economy began to recover. Other countries,, e.g., the European Union, Japan, Great Britain, followed similar policies of quantitative easing.

To see how open market operations work, suppose that you own a U.S. bond valued at \$100,000 paying 5% or \$5,000 each year. Once issued, the \$5,000 is fixed. The only thing that can change is the price of the bond if you sell it. Now suppose that the fed offers you \$102,000 for the bond. Note that this effectively lowers the interest rate on the bond since $\$5,000 / \$102,000$ is slightly less than 5%.

Now, you sell, and the Fed issues you a check. Note that everything is in balance. The Fed has the bond and you have a check for \$102,000 which you happily take down to your bank and deposit which *increases* both the supply of money and *your bank's reserves* at the Fed (when your bank returns your check to the Fed). Do you see what happens. Your demand deposit increases the money supply by \$102,000 . The bank must maintain a reserve of \$10,200 (assuming a 10% reserve requirement) so excess reserves of the bank rise by about \$91,000. Now the money multiplier begins to work. With the increase in excess reserves (and total reserves), banks hopefully will begin lending greater amounts of money, presumably at lower interest rates.

With a 10% reserve requirement, and an increase in high powered money of \$102,000, the potential increase in the money supply is easily calculated at \$1,020,000 based on the one bond alone. In the process, interest rates will be forced down as banks seek out borrowers who wish to increase their investment or consumption (perhaps lower interest rates will entice you to purchase a new refrigerator) and aggregate expenditures will rise, hopefully increasing employment (and hopefully not inflation). In the process, some banks may lend some of their excess reserves to other banks (remember the federal funds rate). The increase in the supply of excess reserves should lower the federal funds rate, perhaps to the target rate.

If, instead of buying from you, the Fed purchased the bond from a bank, the effect would be the same. The bank would surrender the bond, the Fed would increase the bank's reserves by \$102,000. This amount would be available for lending. We assume that the bank will usually begin looking for people to loan money to (since it does not make money on idle cash) and the process would continue as described above.

b) Now suppose the Fed decides it went too far and wishes to reduce the money supply. It still holds the bond it purchased from you. So it now offers to *sell* you the bond for \$98,000. Since it still pays a coupon rate of \$5,000, the effective interest rate on that bond is now above 5% ($\$5,000 / \$98,000$). So you happily buy the bond back. The Fed surrenders the bond to you, and you write a check for \$98,000, payable from your bank to the Fed. The Fed takes the check, reduces your account by that amount, and the Fed reduces the

amount that it owes your bank by that amount. The money supply is immediately reduced by \$98,000 (remember, open market operations involve much larger sums of money), bank reserves are also reduced by that amount, banks have fewer *excess* reserves (since their reserve requirement was reduced by only \$9,800 but their reserves were reduced by \$98,000). In consequence, not all potential borrowers can be accommodated, interest rates rise, aggregate expenditures/aggregate demand are reduced, and GDP is reduced lowering the pressure on prices and hopefully inflation declines. Eventually, the money supply is reduced by \$980,000 (\$98,000 times 1/.1).

You should be able to trace out the effect of open market operations using the bank balance sheet shown on page 11. When the Fed buys a U.S. bond from a private person, the demand deposit of that person rises by the amount of the bond, total and excess reserves held by the bank where you deposited the check also rise, and the Federal funds rate should fall as well as other interest rates.

In sum, in ordinary times, *monetary policy is managed primarily* through buying or selling U.S. government securities through open market operations. If securities are purchased, the money supply will rise, bank reserves will rise, interest rates will fall, and aggregate expenditures will rise (hopefully). The opposite will occur if securities are sold.

To be exact, if the Fed buys bonds through open market operations, the AS curve falls slightly (shifts to the right which is the same thing), since business can borrow money at lower cost lowering their cost of production, and the AD curve moves to the right (if additional loans are made for investment or to purchase houses and other items) in what we can hope will be a series of rightward shifts reflecting the effects of the multiplier.

Of course, the opposite of all this occurs if the Fed sells U.S. securities.

17D. Paying Interest on Bank Reserves:

During 2008, the Fed, *for the first time*, began paying interest to commercial banks on the reserves held by the Fed. The rate paid can differ between required reserves and excess reserves. Interest on required reserves is paid in order to compensate banks for the loss of interest that they could earn on these reserves (allegedly - the actual rate is vanishingly small). These interest payments give the Fed a new tool for stabilizing the economy. In principal, the higher the rate of interest paid by the Fed, the greater incentive of commercial banks to hold excess reserves at the Fed, rather than lending them out. Of course, the opposite is true, the lower the rate of interest paid to commercial banks, the lower the incentive of commercial banks to hold excess reserves at the Fed. This new tool of the Fed has not yet been used enough to assess its effectiveness.

It is worth mentioning that the European Central Bank (ECB) has started to **charge** European banks interest for the deposits they hold with the ECB. This done in order to encourage banks to lend out their reserves. This makes possible negative interest rates since it may pay banks to charge/.pay a small negative interest rate rather than pay a higher rate on idle bank reserves.

17E. Helpful Hint: It may help to remember the term, BESC, to remind you how open markets operate. BE means buy to expand the economy, and SC means sell to contract the economy. If the Fed buys, then reserves rise, interest rates begin to decline, aggregate demand/aggregate expenditures rise, GDP rises, and unemployment declines. The opposite occurs if the Fed sells assets. You need to be able to trace out the

way events unfold if the Fed buys or sells assets.

18. How is monetary policy managed?

Within the Federal Reserve, the Federal Open Market Committee (FOMC), not congress, is responsible for implementing open market operations, while the Board of Governors looks after the discount rate and reserve requirements. The FOMC committee consists of the 7 members of the Board of Governors, and 5 of the 12 Federal Reserve Bank Presidents, appointed on a rotating basis - however the other Federal Reserve presidents attend all meetings, but do not vote on changes in open market operations.. This group is headed by the Chairman of the Federal Reserve Board, The FOMC meets at least *eight* times per year to decide whether the economy needs to have lending expanded or contracted through buying and selling securities, usually government bonds. Additional meetings can be held if needed. The meetings of the committee, which are secret, are the subject of much speculation on Wall Street, as analysts try to guess whether the Fed will tighten or loosen the money supply, thereby causing interest rates to rise or fall, which can have a major effect on the stock market.

The key variable to watch is the target for the federal funds rate. This is the interest charged by one bank in order to lend funds to another bank. If the Fed announces that it is setting a target of lowering the federal funds rate, the Fed is, in effect, announcing that it intends to engage in open market operations by buying bonds and other securities in order to increase the reserves owned by banks at the Fed. If the Fed announces a target of raising the federal funds rate, it does so by selling bonds and reducing reserves of the banking system. The media often reports this as raising or lowering the federal funds rate, but it actually is raising or lowering the *target* for the federal funds rate.

Open market operations have great advantages over fiscal policy tools (see notes 11 and 12) used to stabilize the economy:

- They are relatively free of political influence, at least they have been so far.
- They can be implemented quickly, within a day or two if needed.
- They can be quickly turned off or on.
- They can be implemented in the amount believed to be needed - e.g. fine tuning the economy as compared to the blunt tools of massive public works or tax changes.

19. How effective is Monetary Policy?

That is uncertain. Clearly, if the availability of lendable funds increases, there is an incentive on the part of banks to make some return on their excess reserves even if they have to lower interest rates. And as interest rates decline, there is an incentive on the part of some people to increase investments, purchase homes, automobiles, go on vacation, increase credit card purchases, etc. The uncertainty lies in how long it will take for action by the Fed to translate into increased purchases by investors and consumers. If consumers have high expectations about the economy, then it will probably not take long. If they have low expectations, then any positive effect of interest rate reductions may be overwhelmed by reluctance of consumers and investors to increase debt - as happened during the great recession.

Conversely, suppose the Fed reduces lendable funds and interest rates increase. This is likely to be done when the economy is at a high level of employment resulting in excessive inflation. One would expect that the effect of high interest rates on consumption and investment would take place rapidly unless very

optimistic expectations overwhelm the effect of higher interest rates and people begin to max out credit cards. This is likely to occur during boom times and a high demand for loans.

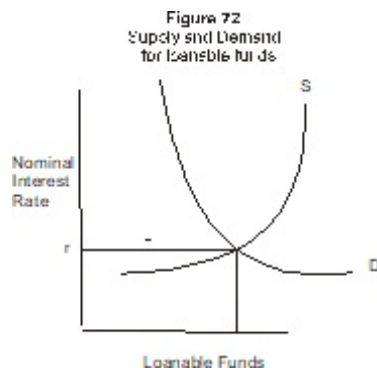
We should note that the Power of the Fed over the rate of interest depends upon many factors, e.g., people expectations about the economy, exchange rates, the shadow banking system, the level of unemployment, the world economy, etc. However, the Fed can almost always cause interest rates to rise or fall.

20. Optional: What happens if money is placed in a savings or time deposit?

Basically, the institution maintaining the savings deposit will set aside a reserve and lend out the remainder, just as banks do. The reserve can be smaller than for checking deposits since there is a presumption that people will be less likely to withdraw funds from savings or time deposits. M2 will rise a little more than M1 (because the savings deposit is not counted in M1). Note that the savings institutions (that do not maintain deposits at the Fed) will make a loan by issuing a check drawn on a commercial bank which will be spent and then redeposited in another commercial bank. Even though the original deposit was placed in a **savings** deposit, the money never leaves the commercial banking system since these institutions that do not belong to the Fed will maintain their own checking deposit accounts in a commercial bank (often termed a correspondent bank).

21. How are interest rates determined?

First, we need to be specific on what we mean by the interest rate. Obviously, there are many different rates depending on the type of purchase, investment, or other use that the loan is made for, and the riskiness associated with the person or organization seeking a loan. In the following, we will assume that this structure of interest rates can be represented by one rate. This is done to simplify the discussion. Obviously, when interest rates rise, this will usually mean that most interest rates rise and vice versa.



Second, we need to distinguish between the nominal rate of interest, i.e., the market rate, and the real rate, i.e., **the nominal rate minus the inflation rate** that we discussed previously. These two rates are closely associated with one another and either one can be used as a proxy for the other. Actually, both this text (not true of some other texts) and I prefer to use the nominal rate. I believe that changes in the nominal interest rates are the most applicable to the effectiveness of monetary policy on stabilization policy and are of most interest to borrowers, investors, and banks. In what follows, we will discuss the determination of the **nominal short-term rate**. The following is called the loanable funds approach and is described in the text.

In figure 72, the supply curve (S) shows how the amount of available loanable funds increases as the interest rate rises. This is perfectly logical. As interest rates rise, banks and others find that it is more expensive to hold cash (the opportunity cost of holding cash is the interest rate), or excess reserves.. On the other hand, as interest rates rise, the demand curve (D) shows how borrowing declines as it becomes more expensive to finance investments, a house, large durable goods purchases, credit card purchases, etc. It is a simple matter of supply and demand with “r” showing the market determined rate of interest, and “q” the amount of loans made.

Where does the supply of loanable funds come from? In the short run, however, loanable funds are

derived from current savings, past loans that are repaid, **and** money creation.

What happens when the Fed increases the amount of reserves available to the banking system by **buying** government securities on the open market? It should be obvious. The supply schedule for loanable funds shifts to the right (see figure 73). The increase in supply causes interest rates to fall, investments to increase, auto and other purchases to increase, etc. This causes a rightward/ downward shift in the AS curve and a rightward shift as well as a movement down the AD curve (see figure 73), and in consequence, an increase in employment. The opposite occurs when the Fed decreases the amount of reserves available to the banking system by selling government securities on the open market.

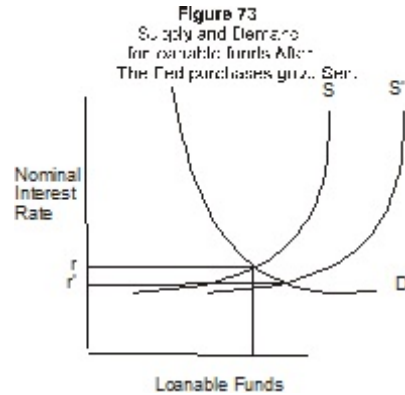
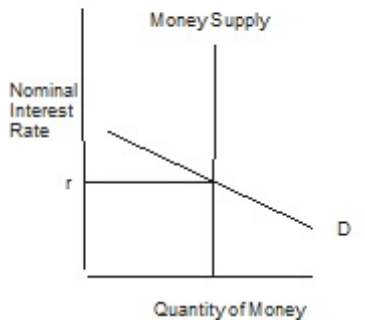


Figure 74
Liquidity preference approach to determining the interest rate



Optional - you will not be tested on this. A second approach to the determination of the interest rate is the liquidity preference approach. This is also an application of supply and demand analysis. As in the loanable funds approach, the vertical axis (figure 74) shows the nominal interest rate.

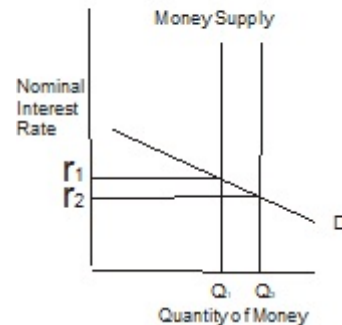
*The horizontal axis differs from the loanable funds approach in that it shows the quantity of money made possible by the policies of the Fed. In this, and in the original Keynesian formulation, the quantity of money is considered fixed and is represented by a **single** vertical line. By now, we should realize that at a point in time, the quantity of money is not quite fixed, but this is a close enough approximation to the real world*

The liquidity preference approach assumes, quite reasonably, that the demand for money that people wish to hold will rise as the interest rates fall, and people increasingly hold on to money for precautionary and speculative reasons and possibly because they do not feel it worthwhile to buy interest bearing securities when the return is small.

The liquidity preference graph is shown in figure 74. Whoops, two different approaches to interest rate determination. What if they yield different results? They cannot. They are both designed to show the same dependent variable (the rate of interest). If by some chance the results differed, it would be a temporary phenomenon as one or the other of the two markets must not be in equilibrium.

Actually, the two graphs can be confusing. The demand curve shown in the loanable funds approach show how the demand for borrowed funds increases as the interest rate fall. The demand curve shown in the liquidity preference approach shows the reluctance of people to lend money (i.e., they wish to keep their money in the bank) as interest rates fall. No wonder many people find economics confusing.

Figure 75
Liquidity preference approach to determining the interest rate



How do Fed open market operations affect the liquidity preference curve and the equilibrium rate of interest. Assume that the Fed purchases government securities on the open market. As we have seen, this shifts the supply curve of loanable funds to the right. In the case of liquidity preference, it shifts the money supply to the right - the interest rate falls (fig.75), and the AD curve shifts to the right.

22. Where does the Federal Reserve get the money to carry on open market operations.

The do not get it through increased taxes. When the Fed purchases a bond, it gains an asset. At the same time, it incurs a liability as it must write a check to a bank, business, or an individual. This necessarily results in an increase in bank reserves when the proceeds from selling the bond to the Fed are deposited. Note that the Fed has simply promised to make a payment, no hard cash has physically been involved. It is exactly like you when you buy items on credit.

In fact, what has happened is that when the Fed increases banking reserves, it simply creates promises to pay, and these promises to pay are used as money. Sometimes you will read where this process is called “printing money.” Actually, it is the same thing, but these promises to pay, which are nothing more than bank entries, are cheaper than printing up cash.

Incidentally, the bills that you have in your purse or wallet are exactly that, promises to pay, the same as I.O.U.s. All money is basically government promises to pay that are passed around to people who happily trade these I.O.U.s for goods and services or save them in order to build up wealth. Accumulating these promises to pay does involve risk however, particularly if too much money is created, people may begin an excessive level of spending, and inflation will reduce the value of the monetary unit.

23. Long run, short run:

If there is any one thing that economists are good at, it is confusing students. They do this happily by mixing up and flinging around theories and variables variously described as the long run, the short run, the natural rate (e.g. GDP), the real rate (e.g., interest) and a few others, each of which is presented in a logical, reasonable way (usually). But students, overwhelmed by the multitude of new ideas, have difficulty keeping these distinctions straight, at least until after they have had a few years of arguing and discussing these concepts. Truthfully, economists love long term and equilibrium concepts. Once you begin to master them, they actually turn out to be logical, helpful, and fun to play with.

The long run is important. It shows where variables are trending and the major forces that are moving the economy. In this sense, it is entirely appropriate that the long run analyses focus on concepts that are described as natural, and/or real. My problem with concentrating on the long run is that we never reach the predicted outcomes. The economy is too dynamic, changes too frequently, and people are unwilling to wait for years for events to play out. Supply and demand curves are constantly shifting, changing both the short run and long run equilibrium variables.

Economics is, by its very nature, heavily focused on studying policy changes which affect the nation in the near future, not in some far distant future that in most cases will never be realized (I use these words with caution since economic growth, i.e., expanding the production possibility frontier, is likely to have a long run focus). In the short term, we consider how to reduce unemployment, how to control inflation, etc. Invariably we work with nominal variables, not “real” or “natural” variables (with some exceptions such as “real income” or “real GDP.”).

I believe that a better sorting out of these variables would make it simpler for students and others to understand economics and would probably reduce some of the foolishness that is common among politicians and commentators.

A little more: The Fed has produced some excellent videos describing much of what has been discussed. They can be accessed by streaming video at:

<http://www.federalreserveeducation.org/news/multimedia/videos.cfm>

Review questions

1. What is the Federal Reserve System? In what way does the Federal Reserve System serve the same role for commercial banks as commercial banks do for individuals and businesses?
2. What if the Board of Governors of the Federal Reserve System?
3. What are the Functions of the Federal Reserve System?
4. What mechanisms can the Federal Reserve use in regulating the supply of money? What is meant by the term “high-powered money?”
5. Describe what is meant by the term “reserves” held by commercial banks?
What are required reserves? What is meant by the term “excess reserves” held by commercial banks?
6. What happens to the money supply if the Federal Reserve raises required reserves?
7. What is the “Federal Funds” rate and what is it used for?
8. What is the primary purpose of the discount rate when used for by the Federal Reserve?
9. What is meant by the transactions demand for money? What are the types of assets that primarily serve this purpose? What is the definition of M1?
10. Will increasing the supply of money affect interest rates? Why? If so, what will be the effects of these changing interest rates on aggregate expenditures and why?
11. Would U.S. currency be considered money in France? What is meant by the term “legal tender?”
Would silver ore be considered “legal tender” in the U.S.? Is a checking account legal tender in the United States?
12. If the reserve requirement for commercial banks was .10, by how much could the money supply grow if the Federal Reserve purchased \$100 million in bonds from banks?
13. What is meant by the term, “liquidity?” Is a car considered a highly liquid asset? How about stocks?
14. Is a Visa card considered money? Do many people use it like money? Does it effect the transactions demand for money? How?
15. Name 3 international reserve currencies?
16. Why does the banking system never really lose the money that it lends out?
17. Suppose a bank has \$10 million in reserves, and is fully loaned up with a reserve requirement of 20%. a) By how much can the bank expand loans if the reserve requirement falls to 10%.
18. If the Federal Reserves buys \$10 billion in government securities through open market operations: a) By how much do reserves in the banking system rise? b) If the reserve requirement if 25%, by how much can demand deposits rise? c) Will interest rates rise or fall? d) What is the probable effect on investment in the U.S.?
19. What are financial intermediaries? Why are they so important?
20. What are open-market operations? How do they increase the reserves available to the banking system? How does this lead to an increase in the money supply?

21. What is the federal funds rate? What is the discount rate? What is the difference between the two rates?
22. What is the Federal Deposit Insurance Corporation? Why is it a good idea to place your money in a bank covered by the Federal Deposit Insurance Corporation?
23. What is the relationship between high-powered money and bank reserves? What can be counted as bank reserves under the federal reserve system?
24. What is the precautionary and speculative demands for money? What types of very liquid assets primarily fill these needs? What is the definition of M2?
25. What is liquidity preference? What are loanable funds? Draw graphs showing interest rates are determined using these two concepts.