

Week 3 Learning Objectives

- Understand the basic functions of money and the role of money in the economy.
- Understand how inflation can undermine money's functions.
- Learn about the Federal Reserve System and how it works.
- Understand how the Federal Reserve System is structured.
- Understand the tools and instruments of central bank operations and monetary policy.
- Become familiar with modern day debates about central bank autonomy, transparency, and the proper objectives of monetary policy.

Week 3 Lecture - The FED



Make sure you read the money supply definitions in the first part of Chapter 5 of FMI. For the most recent money supply data (it is updated every week), check out the Federal Reserve's website at <http://www.federalreserve.gov> Look under the research and data category, then click on statistics, and retrieve money stock data.

Looking at the Fed web site, you can also gather data on monetary growth and many other interesting areas. During most of the 1990s, the Fed allowed the money supply to expand and today's monetary policy (including the 8 Fed interest rate increases in the last year or two) is still considered to be accommodative.

The Fed does its best to try to influence the economy so that it grows constantly at a steady pace. They do this primarily through Open Market Operations and the setting the Fed Funds rate. But raising and lowering this rate they control how much money is in circulation as they are either removing funds from circulation (tightening) or increasing funds in circulations (loosening). This is the gas and the brake (so to speak) of the economy. Basically, if the economy overheats it leads to inflation and to avoid that they will raise interest rates until the economy cools a bit, in other words hit the brakes. If the economy is sluggish or slowing, they will lower interest rates to get it moving again, essentially stepping on the gas. That may sound easy, but with an economy the size of the US we don't really turn on a dime. It's more like a huge tanker on the ocean, you must anticipate what's a head and act accordingly or you'll find yourself in trouble.



Many pundits will second guess the Fed and their decisions about when to move rates and how to act with regard to the economy. This is especially true in an election year and with those running for office or those stumping for those running for office. Try to ignore that noise. The Fed is a group of very smart dedicated individuals doing their very best to make

good decisions for the entire economy. They are appointed for 14 years and are not reappointed. They are almost completely independent of all outside influence. They have their own budget that Congress can't mess with, the President nor Congress can't mandate they do something, and this allows them to do unpopular things such as rising interest rates to slow the economy to avoid inflation just as everyone is feeling so good about what's going on. They have to avoid inflation so they kill the party with higher rates and that's never popular. But they do it anyway. Other countries don't have a separation between the Central Bank and the President.

The President is the Central Bank and he can do what he wants.

Leaving a politician to their own devices in running monetary policy creates a horrible situation because as the politician panders for votes, they are very likely to have a loose monetary policy and that leads to inflation. We see this all the time, often in South America. Although recently President DaSilva in



Brazil has stepped in to the limelight as an economically intelligent leader, previous South American countries have had out of the world inflation. Some of that is due to the fact that there wasn't an independent Central Bank that could say no to the President. Here the Fed Chairman is the most visible part of the Central Bank and he has no problem telling the administration or Congress exactly what he is thinking nor do the other members of the Fed, although it's often done behind closed doors.

Currently, the Fed is currently focused on keeping our economic growth going but removing the highly accommodative monetary policy that gave us the lowest interest rates in 40 years. They aren't stepping on the brakes so much as they are just taking their foot off the gas. Once that goal is accomplished, the Fed will probably stop raising rates and allow the economy to just roll along until it sees a pattern of it slowing or speeding up and then it will adjust accordingly. The last series of interest rate hikes weren't intended to slow the economy so much as just removing the excess and return it to a more neutral environment. But if they see the economy start to take off, they won't have any problem at all continuing to raise rates to slow it.



One other thing. You will notice that the Fed almost always moves in very slow steps with $\frac{1}{4}$ point rate moves. This is for many reasons but one is so they won't jar the markets and create a major problem for the firms and traders in them. They have learned over the years to signal the markets very subtly about what they are going to do and then stick to their word. If they move too fast or change their mind, it could have a significant

impact on those in the market leaving them with large losses which can be avoided if everyone just gets on the same page. So Greenspan and company try to do things at a measured pace while telegraphing their moves for the most part. Now on occasion when they want to send a strong signal to the market, they move in between meetings and sometimes abruptly. This is done knowing that they will be the talk of the trading floor and they will certainly get their point across. For example, when the dot com bomb was going off, they sent a clear signal that they were going to move interest rates significantly lower by dropping ½ point in between meetings in a surprise announcement. This settled equity markets and allowed a slower steady decline without a collapse. The message was that the Fed was on the job and fully aware that the economy needed a boost.

What they are shooting for is stable prices with as much employment as can be maintained. In other words, low inflation and low unemployment. Inflation usually takes precedent as inflation affects all of us and unemployment affects far fewer. A balance between the two is difficult as one seems to offset the other ala the Phillips Curve. More on the Fed next week also. So go to their web site and check out all the great information.

Supplementary Lecture – Money, Velocity and Amount

You may have studied the equation of exchange in previous economics courses. I will review some of the basics here.

The equation of exchange is an economic identity that states that $M*V=P*Q$. M is the money supply, V is the velocity of money, P is the price level, and Q is the level of output. In the national income accounts, $P*Q$ is equivalent to nominal Gross Domestic Product (GDP), and Q is equivalent to real GDP (e.g. GDP absent the effects of inflation).

The equation of exchange is fairly straightforward in its meaning if you think of V as the rate at which money turns over to support a given level of spending ($P*Q$) in the economy.

Many economists assume that Velocity (V) is fairly stable over time. Most economists also assume that Q, which is output or real GDP, has a fairly steady long-run (or trend) potential growth rate. Let's assume that the potential growth in U.S. output (Q) is about 3.5% per year and V is constant. Then if the Fed expands the money supply (M) at 5.5% per year, we will get inflation (P) of about 2.0%. Here's the math.



$M*V=P*Q$ implies:

$\% \text{ change in } M + \% \text{ change in } V = \% \text{ change in } P + \% \text{ change in } Q$

Substituting the above numbers:

$5.5\% + 0\% = \% \text{ change in } P + 3.5\%$

As you are probably aware, there is a lot of controversy about what the correct estimate of U.S. potential economic growth is. Until a few years ago, most economists (and central bankers) thought that the long-run potential growth of U.S. real GDP was somewhere around 2.5%. Now, due to the recent surge in productivity growth resulting from the application of information technology, many have upgraded their potential growth estimate. Several Fed Governors have stated that they believe potential real GDP growth may now be near 3.5%, implying that monetary growth of near 5.5% would be appropriate to keep inflation near 2%. (All of this assumes, of course, that the velocity of money is constant, an assumption which a number of economists question.)

So when you are running a company someday and you read that GDP was 3.5% last year, that's about what it should be. Higher and it's inflationary and lower it's sluggish. That is a reasonable benchmark to compare whatever is currently going on.

The Federal Reserve does not explicitly set monetary growth targets, but over most of the past decade the Fed has kept M2 growth at an average of around 5-6% per year. The European Central Bank sets an explicit target for M3 growth of 4.5% per year.



Some central banks, such as those in Canada, Britain, Sweden, Australia, and New Zealand, operate monetary policy by setting strict inflation targets. The thinking is that it is very difficult to hit monetary growth targets and, even then, to know how changes in the money supply will impact the economy. So central banks should continually adjust monetary growth to hit a desired inflation rate. There is some good logic to this trial-and-error approach, given the imprecision of monetary policy in practice.

Make sure to browse the fed site and bookmark it for future use as it contains wonderful information about the economy that has the benefit of less biased than viewing the economy through some reporter or analysts eyes.

Lecture - Monetary Policy

This lecture will conclude our two week tour of the Federal Reserve and Monetary Policy. It will incorporate some of the issues of Chapter 4 and 5. Be sure by the end of this week that you are familiar with how the Fed works and what it is trying to accomplish.

The Federal Reserve System

As we know, the Federal Reserve System (the Fed) constitutes the central bank system for the United States. It is governed by officials who are not elected, but appointed, towards the goal of a leadership which is immune to political pressure. The intent of this design is well-received, because the Federal Reserve's policy decisions are always one of the day's top news stories. So you may ask, "What is the Federal Reserve, and what does it do?"



Functions of the Fed: To Create (and Destroy) Money

The Fed is the source of the money supply of the United States. As the central bank of the United States, the Fed has the authority to credit or debit the reserves of banks holding reserves with it. In doing so, it is creating or destroying money in the economy. In the matter of cash, it has the legal authority to issue coin as well as Federal Reserve notes (paper money.) The revenue the government gains from creating reserves and hard cash is technically known as seigniorage, defined as the revenue gained by the mint from the creation of money.



In the days of commodity currencies (gold and silver), the minting of coins added value to each ounce of precious metal by putting it into a form (a coin, such as a sovereign, a ducat, a real or a dollar) which had a readily-recognized value. In other words, the precious metal had been assayed for value, purified and measured into units of a suitable size for commerce. In return for this service, the mint reserved a portion of the coins for itself. The seigniorage (the profit or revenue from minting) represented the positive difference between the face value (or par value) of the coins, less the value of the metal used to make it.

Today, there is no significant portion of United States coinage which is minted from precious metals, and so they have little commodity value.

The seigniorage for paper money is even higher; the value of the money printed in bills far exceeds the value of the linen it is printed on. The actual creation of bank reserves by the Fed is now conducted as an electronic accounting matter, without even the transfer of precious metals between vaults. For all of these (coins, paper, electronic reserves) the ratio of seigniorage to costs is quite high.

Since 1971, the world's major economies have used currencies based on inconvertible paper standards, more commonly known as fiat money. (Convertible paper standards use bills which are redeemable for gold or silver, such as the silver certificates of 35 years ago. "Fiat" is from the Latin for "let there be...") Currently, the U.S. government raises about 3% of its revenue from seigniorage. Other first world countries (such as Italy) have been known to raise as much as 10% of government revenue through the creation of money, though the European Union has been an important source of discipline on many central banks. Generally, destructive levels of inflation result from a government's over-reliance on seigniorage for revenue.

To Conduct Monetary Policy

The function of the Fed most discussed in the popular press is that of conducting monetary policy. In an ongoing process, the Fed tinkers with the availability of money, using several different tools described below.

The Fed has the authority to set the reserve requirements observed by depository institutions. In doing so, it proscribes the portion of a bank's deposits which must be held in reserve, and not extended as loans to DSU's. Because of the process of deposit expansion, where the reserve requirement determines how much of a deposited dollar remains available for a loan, higher requirements reduce the funds available for loans, and thus make money less available in the economy. A lower reserve requirement frees up funds from unproductive reserves, and makes money more available in the economy. It is currently the view of the Fed that frequent tinkering with the reserve requirement would destabilize financial markets, and so it is the least frequently used tool of monetary policy.



A change in the discount rate is a change in the interest rate at which the Fed loans money to depository institutions, generally to tide them over short-term liquidity problems. Like the prices for anything else, banks will borrow more from the Fed if the discount rate has been lowered, and will borrow less if the discount rate has been raised. This tool is normally not used often, and is of limited efficacy because banks have other sources of loans besides the Federal Reserve. Because of this, a change in the discount rate has as

much effect as a signal of Fed policy, as it does as a genuine price change.

Open market operations are the means normally used by the Fed to affect the money supply. These changes are effected by the Fed crediting (or debiting) bank reserves electronically, as it settles accounts for the purchase (or sale) of federal securities. If the Fed wishes to increase the money supply, it purchases securities, and effects payment by crediting the selling institution's account at the Federal Reserve Bank. This increase in reserves means that the funds that it holds available for loans are larger, even after a portion is held as the reserve requirement. On the other hand, if the Fed chooses to decrease the money supply, it sells securities, and takes payment by debiting the purchaser's account, and so reducing funds available to loan. Because open market operations are the simplest to implement, and are the quickest to take effect, they are the tool of monetary policy most frequently used by the Fed.

To Regulate and Support Institutions

The Fed is also a custodian of the safety and soundness of the deposits place by consumers in banks and savings & loans. It has had the role of ensuring that these institutions restrict themselves largely to the business of banking, though this has been relaxed somewhat by the effective repeal of the Glass-Steagall Act in 1999. As part of this mission, the Fed has the discretionary ability to shore up bank's reserves against temporary liquidity crises by being the lender of last resort.

When a bank needs to borrow funds to overcome a temporary shortage, the Fed may (or may not) choose to extend a loan, at the rate set for all such loans, known as the discount rate. As specified in Regulation A, such a loan can be extended to cover particular circumstances. Emergency credit can be extended to entities which are not depository institutions, when it is in the best interests of the United States economy, and when funds are not available from other sources. Extended credit may be given to depository institutions which are undergoing exceptional circumstances, or a group of institutions which are undergoing exceptional liquidity strains (such as a bank run.) Seasonal credit is reserved for smaller institutions experiencing severe annual cycles in their funding needs, and without access to other funds. Adjustment credit is extended to help borrowers meet their needs when their usual sources, including institutions peculiar to their industry, are not available.





The Fed discourages habitual borrowing from the Fed's discount window. An institution which is in the habit of borrowing funds from the Fed may be considered in abuse of the privilege, and denied funds. It may also be targeted for auditing by the Fed, to evaluate whether it is sound, and being run responsibly.

Under abnormal circumstances which affect the economy or financial markets, the Fed is at liberty to be more forgiving of these restrictions, if it is seen to be in the best interest of the nation's economy.

Not incidentally, the Fed has also replaced the private clearinghouses of the 19th and 20th centuries as the dominant clearinghouse for facilitating transactions between banks. The fact that the Fed holds reserve accounts for so many of the nation's banks gives it a strong economy of scale in this regard. Generically, this function is also known as payments services.

Organizational Structure of the Fed

The administrative center of the Fed is the seven-member Board of Governors. Each member serves a fourteen-year term by presidential appointment. Although the terms are normally arranged so that a different board member's term expires every two years, this timing can be disrupted by resignations or deaths, as has happened several times in recent decades. The staggered timing of the terms is another facet of the Fed's design that was intended to insulate its decision-making from contemporary political pressures. A board member is only permitted to serve one full term.

At any given time, two of the board members are serving four-year terms as Chairperson and Vice Chairperson, also by presidential appointment.

The United States is divided into twelve Federal Reserve Bank Districts, each with its own Federal Reserve Bank, located in one of the major cities of the district. The twelve Reserve Banks are located in New York, Philadelphia, Richmond (Virginia), Cleveland, Atlanta, Chicago, Dallas, Kansas City



The twelve-member Federal Open Market Committee (FOMC) is the division within the Fed which actually formulates monetary policy, and directs the open market operations. All seven members of the Board of Governors serve on the FOMC, along with the president of the New York Federal Reserve Bank, and four of the remaining eleven Reserve Bank presidents. The remaining seven Reserve Bank presidents with no voting rights on the FOMC are nevertheless present at all meetings, and are permitted to participate in deliberations. All eleven of the Bank presidents outside of New York ultimately serve on the FOMC, through rotation.

Traditionally, the FOMC chooses the Chair of the Federal Reserve Board as its Chair, and the president of the New York Bank as its Vice Chair, though neither appointment is compelled by regulation.

The responsibilities of the Board of Governors are all linked to the regulation of depository institutions, or monetary policy, or both. The Board supervises the twelve regional Federal Reserve Banks. They regulate bank holding companies and foreign-owned banks doing business in the United States. They supervise member banks, and regulate consumer finance.

Discount rates are proposed by the Federal Reserve Banks, and are confirmed or denied by the Board of Governors.

Finally, it is the twelve Federal Reserve Banks which have the responsibility to lend funds to depository institutions (at their discretion), provide the currency, clear checks, and administer U.S. government debt and cash balances.

You should have some idea by now that monetary policy is an inexact science (or art). This brings up questions about what proper central bank objectives should be. Most economists agree that central banks should focus primarily on maintaining the credibility and purchasing power of a nation's currency, implying they should concentrate on maintaining price stability. A few central banks, such as the Bank of England and the Bank of Canada, adopt fairly strict inflation targets. The Maastricht Treaty says the European Central Bank's sole purpose is to maintain price stability, although in practice the ECB seems to be adopting multiple policy objectives. Some believe that central bankers should concentrate solely on maintaining a fixed rate of monetary growth, which in turn should insure that inflation is stable.

Price and monetary objectives are a good thing, but in reality most central banks have multiple objectives. This is partly because they must answer to their governments and citizens, but also because the empirical support for strict rule driven monetary objectives is mixed. These days most central banks focus on a combination of monetary growth, inflation, economic growth, and (sometimes) exchange rate objectives.



Although the Fed doesn't set any specific targets, an economic growth objective seems to have become dominant at the Fed in recent years. But this is tied to other objectives, as the Fed tries to maintain growth consistent with "price stability". Lately Fed Governors (and many others) have been confused because the U.S economy is soaring at "above potential growth" while inflation has stayed low. This has led to some rethinking about what the potential growth rate of the economy is (economists had thought it was around 2.5 %, but many have raised this number to 3% or higher in light of increasing measured productivity). You can see what a challenge monetary policy is.

I would like to spend a few moments on the issue of central bank independence. There has been a concerted move during recent years to grant increased independence to central banks around the world. The thinking is that central banks should be charged with preserving a country's currency and left to that goal with little interference from politicians. This is a good idea, but the reality is that no central bank is completely independent. As you know, all central bankers are appointed by politicians and they must ultimately answer to them. Also, they live in a political world and will thus react to pressures from politicians, businesses, and taxpayers.

This brings up the issue of central bank transparency. Traditionally, central bankers have thought it necessary to carry out their deliberations in secret and to reveal few details about the thought process behind their decisions (the master in secrecy was the German Bundesbank, which only published its minutes with lags of more than 30 years). Recently, however, there has been a push for greater transparency. Thus, we see central banks publishing the minutes of their deliberations within a month or two after meeting and explaining their decisions in public forums more frequently. This is truly being played out now in Europe, where the Maastricht Treaty provides no obligation for the European Central Bank (ECB) to ever publish its minutes or provide any information about how it reaches its decisions. But ECB governors are being pressured to divulge their thinking publicly, which they have begun to do. The Bank of Japan, which was only granted independence in 1998, is also becoming more transparent. By laying out their views in a credible manner, central bankers in Europe and Japan have been able to pressure politicians to carry out more responsible fiscal and structural policies. Independent, but transparent, central banks seem the best way to go. But remember that a truly independent central bank is impossible to achieve in a political environment (nor perhaps desirable, though some

economists would debate this).

Supplementary Lecture – The Fed Funds Market

Fed Funds are funds which banks lend each other on an overnight basis to meet the Fed's reserve requirements. (Most banks must hold cash reserves equivalent to 10% of their transaction deposits, but day-to-day reserves fluctuate based on transactions activities. Contrary to popular belief, the Fed does not actually set the Fed Funds rate. But it has great influence upon it through its open market operations. For example, if the Fed buys government securities (e.g. Treasuries) from dealers in the open market, the Fed will make payment by adding reserves to the banks where the dealers deposit their funds. This operation increases the supply of bank reserves, pushing down the yield on Fed Funds loans. Similarly, if the Fed sells securities it will secure payment by reducing reserves of the banking system, putting upward pressure on the Fed Funds rate.



When the Fed announces its monetary policy objectives, it sets a target for the Fed Funds rate. It then engages in daily open market operations to achieve that target. If you follow the markets, you will notice that the Fed Funds rate fluctuates quite a bit around the target on a daily basis.

The main point here is that the Fed Funds rate is a market rate determined by the demand and supply of overnight Fed Funds loans between banks. You might say, however, that the Fed “owns” (and thus has ultimate control over) this market since the market is created because the Fed maintains bank reserve requirements.

Calculating the Fed Funds Rate

As speculation mounts about when the Fed will cut the federal funds rate the futures markets offer insight on the next Fed move. Here's one way to calculate them:

The federal funds market is where banks lend money to each other; the Fed influences this market by putting money in or draining money out to try to keep the interest rate near its target. Futures contracts based on the fed funds rate are traded at the CBOT. So you can basically bet on what the rate will be for any given month. The contracts are priced on the basis of 100 minus the average effective federal funds rate for the delivery month. So, a price of 94.75 for the April contract, for example, implies an expected rate of 5.25% for that month.

To calculate where the market sees the rate in the future, first find the current prices of fed funds futures at <http://www.cbote.com/cbot/pub/page/0,3181,1525,00.html> Obviously, this

changes all day long. The contracts expire (and must be settled) on the last weekday of the month.

To determine what the market expects the Fed to do at its next gathering, find the contract for the month following the coming meeting. For example, look at the October contract for clues to the Sept. 18 meeting. Next, calculate the fed funds rate that is implied by the price of the futures contract by subtracting the futures price from 100. Using an example of 95.14 as the price, the markets expect the fed fund rate to be at 4.85% in October. That implies a cut of 40 basis points from the current rate target of 5.25% in this example.

In this scenario, a quarter-percentage-point rate cut is fully priced in obviously as they think it will be more than that. In order to determine the chances of a half-percentage-point cut divide the difference between the real rate and the implied rate by 0.5. For October that works out to an 80% chance that the Fed will trim rates by a half percentage point this month ($0.40 \div 0.5 = 0.80 \times 100 = 80\%$). In other words, they are 80% of the way to fully pricing in a 50 basis point cut. To estimate the chances of a three-quarter-percentage-point cut divide by 0.75. That translates to a 53% of the way to a 75 basis point cut.

Remember that this is the real world, not a target that is written down in some meeting. So the contracts are trading on the real fed funds rates as they are traded. You can see the actually traded numbers here: <http://www.ny.frb.org/markets/omo/dmm/fedfundsdata.cfm>

As you will see the real numbers aren't as close to the target as you might think. This isn't typical due to the recent market strains. However, it then becomes far easier to see what may happen and in the last week they have been actively raising the rates back up toward the target. Usually it's very close, but as you can see it's really been a 5% rate for the last month or so.

Here's another way to look at it if you aren't interested in doing the math yourself. Go to <http://www.clevelandfed.org/research/policy/fedfunds/index.cfm> and look at the probabilities of different scenarios according to the Fed itself. This is a bit different in method, but still gives you an interesting look at the chances that the fed will move.