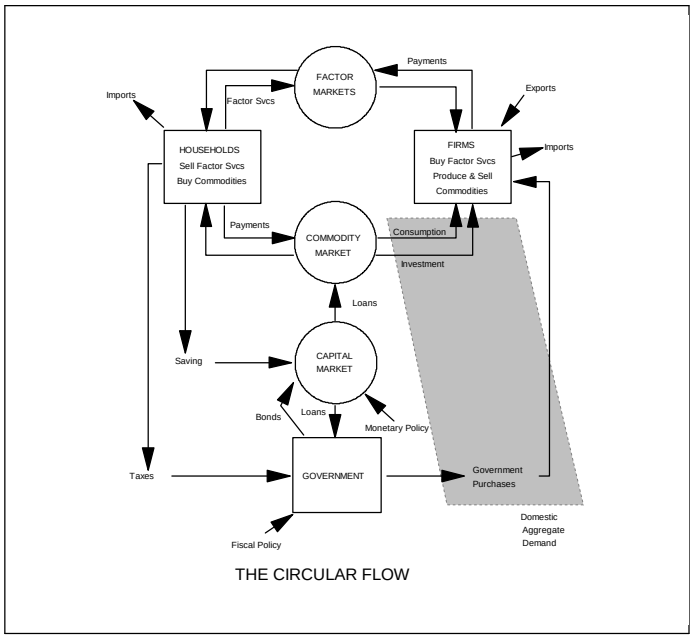
Lecture on Macroeconomic Policy:

Fiscal Policy & Monetary Policy

1 Adding Government to the Macro Economy

So far we have generally ignored the role of government in the macro economy. In fact, it has a potentially large role to play in the performance of the aggregate economy. As the revised circular flow diagram shows, ***{next slide}***

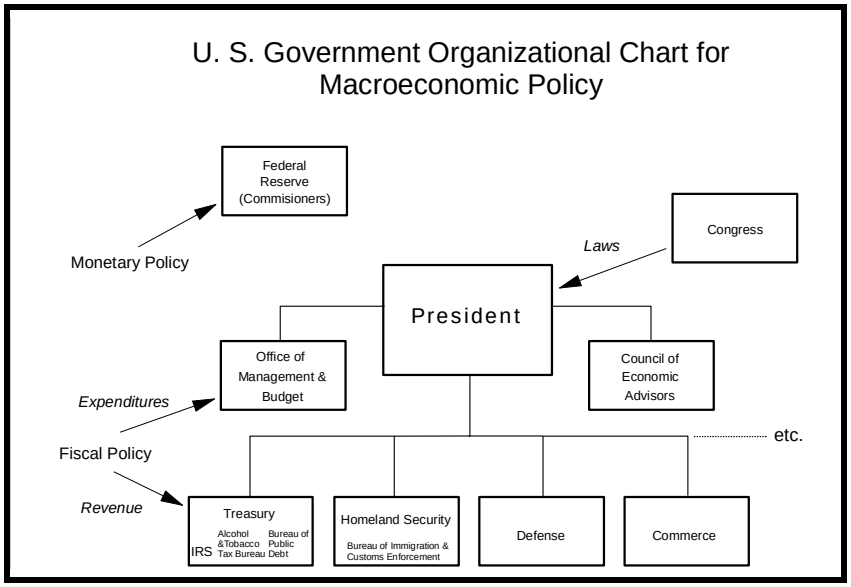


government adds to the demand for goods and services from the business sector, it affects the income received by households (taxes and transfers), and it also affects the financial system because it must borrow money to cover budget deficits. Now, we will see how government can affect the performance of the aggregate economy by changing the level of aggregate demand through fiscal policy and monetary policy. But first,

we need to see how the conduct of macroeconomic policy is organized in the United States:

2 The Organization of Macroeconomic Policy

I've found over the years that some students never entirely figure out who make what types of macroeconomic policy in the United States. So, I'm giving you an organizational chart of the U.S. Government so that you can refer back to it . ***{next slide}***



- **Congress:** passes laws that determine how much money the government can spend (expenditure policy) and how much revenue can be collected from the public (tax [revenue] policy).
- **The Executive:** administers the law as passed by Congress. The President is responsible for the administration of fiscal policy. He/she delegates this responsibility to other agencies:
- **The Office of Management and Budget (OMB)** deals with the expenditure side of fiscal policy: how to make sure that the executive branch spends no more than congress has allocated. OMB is responsible for the coordination of preparation of the annual federal budget.

- **The Treasury** deals with the revenue side of the Government budget. It administers the **Internal Revenue Service**, collects customs duties (**Bureau of Customs),** and excise taxes (**Bureau of Alcohol, Firearms and Tobacco**), and issues Government bonds, bills and notes when the government has to go into debt to meet its spending needs. The Treasury is a government department just like the Departments of State, Defense, HHS, Transportation, and Education, and the Secretary of the Treasury can be the most powerful macroeconomic official in the executive branch.
- **The Federal Reserve System:** This is an independent agency, chartered by Congress that supervises the commercial banking system and is responsible for monetary policy. Monetary policy has to do with regulating the supply of money in the system, which further affects the level of interest rates and the rate of inflation.

The Federal Reserve Bank (the "Fed") was established by Congress in 1913 at the recommendation of a commission set up to study the causes of the 1907 banking panic and to recommend measures to forestall future panics. The Fed's role is to regulate the operations of commercial banks to preserve the stability and security of the banking and monetary system.

There are actually 12 Federal Reserve Districts, each with its own regional Federal Reserve Bank. The "owners" of the regional federal reserve banks (technically corporations) are the member banks, but they do not get to share in the Banks' profits which are mostly donated to the U. S. Treasury. The private banks are more like customers than owners. (North Carolina is under the jurisdiction of the *Richmond Federal Reserve Bank*)

Control of the Fed resides in the 7-member **Board of Governors** of the Federal Reserve System. Appointed for 14 years by the President subject to the advice and consent of the Senate. One of

the members is appointed by the President to serve as Chairman for a 5 year term.

Once appointed by the President, the Board is independent of the rest of government, so long as it stays within its statutory authority. The President, however, has significant long-range authority since he has the power of appointment.

The Federal Open Market Committee (FOMC) made up of the seven Governors and the presidents of 5 of the regional banks has the most day-to-day power. It meets periodically in Washington, DC and determines the course of open market policy.

When the Treasury needs to borrow money it often has to come to the FED to get a loan. The goals of these two institutions are often in conflict: the Treasury wants to get loans for as little interest cost as possible while the FED might be trying to stop inflation by keeping interest rates high. The independence of the Fed has been open to some debate in Congress over the years.

3 Government and Determination of Aggregate Demand

G & T Exogenous

1. Government multiplier
2. Tax multiplier

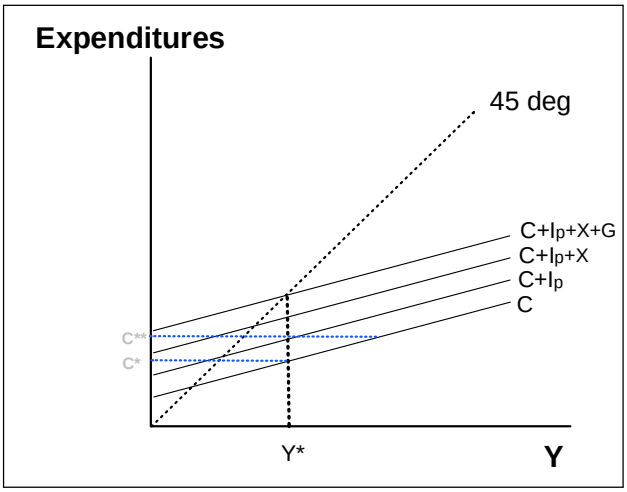
3.1 Simple Model Incorporating Government Spending and Autonomous Taxes

$$Y = C + I + X + G$$
$$C = a + bY_d$$
$$G = \bar{G}$$
$$T = \bar{T}$$

With taxes, $Y_d = Y - \bar{T}$. Now, let's solve for the equilibrium level of Aggregate Demand

$$Y = C + I + X + G$$
$$C = a + b(Y - \bar{T})$$
$$Y = a + b(Y - \bar{T}) + \bar{I} + X + \bar{G}$$
$$Y^* = \frac{1}{1-b}(a - b\bar{T} + \bar{I} + X + \bar{G})$$

<<How do we show the equilibrium level of aggregate Demand graphically>> The same way as before, only now we add a third line showing the level of government expenditure for each level of aggregate demand :



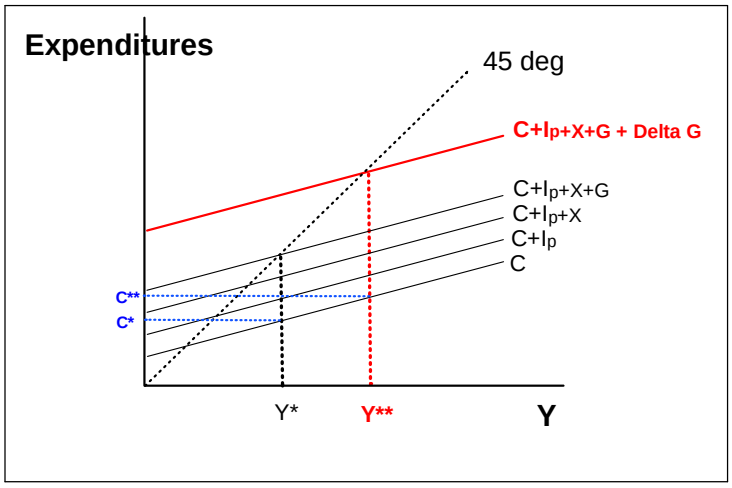
<<What is the equilibrium level of aggregate demand?>> The point at which C + I + G crosses the 45o line.

Suppose that Ag. D < Ag. S: What happens if government spending is increased by ΔG?

$$Y + \Delta Y = \frac{1}{1-b}(a - b\bar{T} + \bar{I} + \bar{G} + X + \Delta G)$$
$$\Delta Y = \frac{1}{1-b}\Delta G$$

$\frac{1}{1-b}$ is the **government spending multiplier** which is the same as the investment multiplier.

<How do we show the effect on equilibrium income of a rise in government spending?>> A parallel upward shift in the G line. {<=} Notice that the Multiplier determines how far to the right the intersection moves.**{Next Slide}**



What if taxes rise by ΔT?

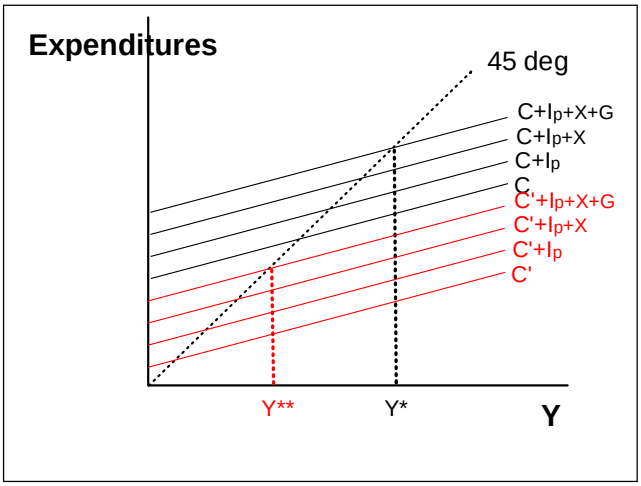
(1) $Y^* = \frac{1}{1-b}(a - b\bar{T} + \bar{I} + X + \bar{G})$
(2) $Y^* + \Delta Y = \frac{1}{1-b}(a - b(\bar{T} + \Delta T) + \bar{I} + X + \bar{G})$

Subtracting (1) from (2) we get

$\Delta Y = \frac{-b}{1-b}\Delta T$.

If taxes rise -- national income falls if government spending is held constant. <<How do we show this on the C + I + G graph?>> The consumption function shifts downward in a parallel manner since its slope

with respect to national income is not affected by exogenous taxes. **{Next Slide}**



Given the consumption function:

$C = a + b(Y - \bar{T}) = a + bY - b\bar{T},$

we have the change in consumption for a given change in taxes as: $\Delta C = -b\Delta\bar{T},$ no matter what the level of income.

What if taxes rise and government spending rises by the same amounts? i.e. $\Delta G = \Delta T$?

$$\Delta Y_G + \Delta Y_T = \frac{1}{1-b}\Delta G - \frac{b}{1-b}\Delta T$$
$$= \frac{1-b}{1-b}\Delta G$$
$$\Delta Y_{BB} = \Delta G$$

A rise in government expenditure exactly matched by a rise in taxes causes national income to rise by the amount of the increase in government spending.

MULTIPLIERS:

$\frac{1}{1-b}$ is the **Government Spending (or Investment Multiplier)**.

$\frac{-b}{1-b}$ is the **Tax Multiplier:** A fall in taxes does not have as large a kick to Y as does a rise in G. This is because part of increased income to households will immediately be saved. *Balanced Budget Multiplier = 1* (smaller than tax cut mult. or government spending mult.

3.2 Adding Income Taxes to the System:

Now, make taxes a function of income

$$Y = C + I + X + G$$
$$C = a + bY_d$$
$$G = \bar{G}$$
$$T = \bar{T}_0 + tY$$
$$I = \bar{I}$$
$$Y_d = Y - T$$

Let's solve for equilibrium level of Ag. Demand, by first simplifying the consumption function:

$$C = a + b(Y - [\bar{T}_0 + tY]) = a + bY - b\bar{T}_0 - btY$$
$$= a - b\bar{T}_0 + (b - bt)Y$$

Substitute this consumption function into the national income definition:

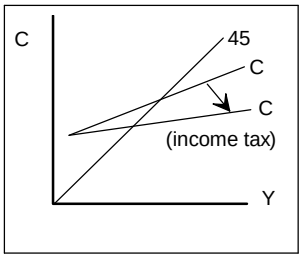
$$Y = C + \bar{I} + \bar{G} = a - b\bar{T}_0 + (b - bt)Y + \bar{I} + X + \bar{G}$$
$$Y - (b - bt)Y = a - b\bar{T}_0 + \bar{I} + \bar{G}$$
$$Y^* = \frac{1}{1-b+bt}(a - b\bar{T}_0 + \bar{I} + \bar{G}) \quad \text{New Equilibrium}$$

Now given that government expenditure rises, how much will national income rise?

$$Y^* + \Delta Y = \frac{1}{1-b+bt}(a - b\bar{T}_0 + \bar{I} + X + \bar{G} + \Delta G)$$
$$Y^* = \frac{1}{1-b+bt}(a - b\bar{T}_0 + \bar{I} + X + \bar{G})$$
$$\Delta Y = \frac{1}{1-b+bt}\Delta G$$

<<Note that the government spending multiplier is smaller. Why?>> Taxes reduce proportion of income that is consumed ... leakages increase because $\frac{1}{1-b+bt} < \frac{1}{1-b}$.

<<How can we show graphically how the introduction of income taxes affects the determination of equilibrium income?>> First, we must recognize that the slope of the consumption function becomes smaller than before. Mathematically we can see this by differentiating the consumption function:



$$C = a + b(Y - [\bar{T}_0 + tY]) = a + bY - b\bar{T}_0 - btY$$
$$\frac{\partial C}{\partial Y} = b - bt,$$

which is smaller than b the slope of our original consumption function. Since more income leaks out of the spending flow the new consumption function is flatter than the old. An increase in income tax rates will make the slope of the consumption function flatter,

$b - bt > b - b(t + \Delta t)$, which in turn reduces the multiplier.

Changing autonomous taxes also has a smaller multiplier effect, since the autonomous tax multiplier is:

$\frac{-b}{1-b+bt}$ which is smaller than the original tax multiplier $\frac{-b}{1-b}$.

Note in both cases, the impact of a change in government spending or a change in average tax rates of a given amount is <u>less</u> when we have an income tax.

WHY? Because a rise or fall in tax rates or government spending is damped by a rise or fall in taxes collected.

>>This is a built-in stabilizer.<<

3.3 GOVERNMENT BUDGET DEFICIT DEFINED

The Government budget deficit is defined as Government expenditures minus revenue: $G - T$.

Now, tax revenue has two components, an autonomous component T_0, and an induced component, tY. So the deficit can be written as:

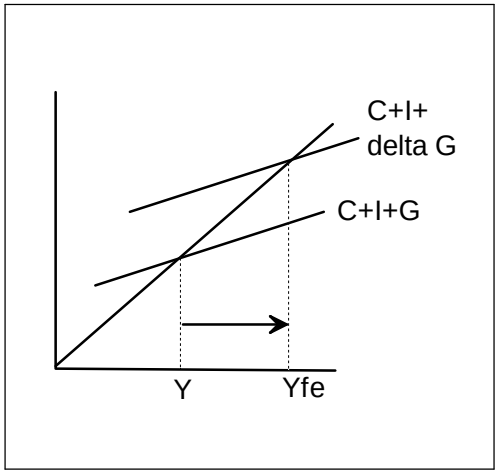
$G - T = G - (T_o + tY)$.

The government budget deficit automatically shrinks when income expands; this is called **automatic stabilization** and it serves to moderate the swing in the business cycle.

3.4 Expansive and Restrictive Fiscal Policy

<<Suppose that the economy is in equilibrium below the natural or full employment level of income. How could Congress use fiscal policy to bring it back to the desired level?>> It could increase the level of government spending (G) to close the recessionary gap. This is

expansive fiscal policy.



<<What about a situation in which aggregate demand is too high?>> Use restrictive fiscal policy to shift the C + I + G curve downward to eliminate the inflationary gap.

<<Could tax policy be used to, say, eliminate a recessionary gap?>> Sure, this is exactly what President Reagan's 1981-82 tax cut did. He lowered income and other tax rates (thus rotating the C + I + G curve in a counterclockwise direction). This led to the largest peace-time budget deficit in American history.

Problems with Fiscal Policy ***{next slide}***

{ Lags in fiscal policy ... like shooting at a moving target.

{. Multipliers are not known with great certainty. Nor is their timing.

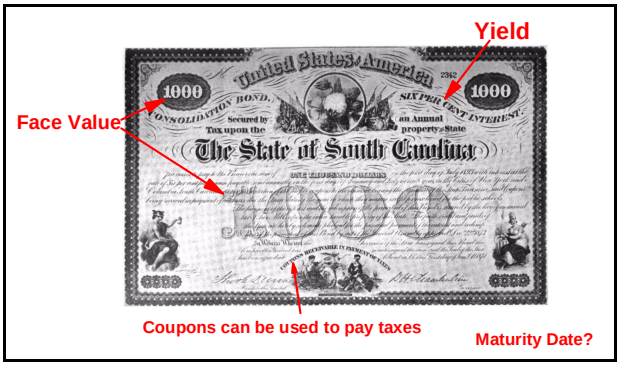
{ Actual identification of full employment GNP may be difficult, especially when it's been a long time since we actually experienced it.

{ Congress, the Fed. and Executive are reluctant to risk inflation with an expansionary fiscal policy, even if output is being lost in a recession.

4 The Government Budget Constraint

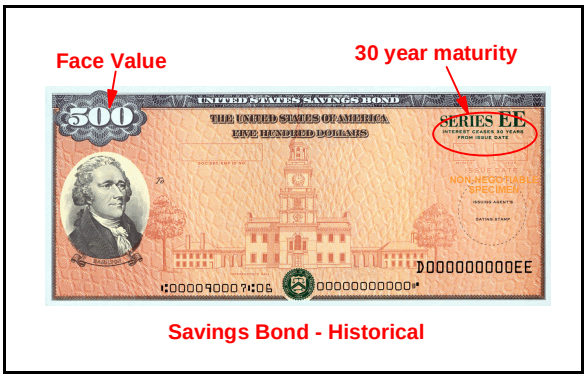
When the government budget is in deficit, i.e., when $G - T > 0$ the Treasury must issue **bonds** in order to extract the purchasing power it needs from the public.

Here's what bonds (used to) look like **{Series of Next Slide**s}:



- **Face Value:** this is the amount in dollars that the borrower (The State of South Carolina in this case) agrees to pay the bond holder at some future data.
- **Yield:** This is the amount in percent annually that the borrower agrees to pay the bond holder. For this bond, the yeld is 6 percent or $60.00 annually
- **Coupons (not shown here):** in the amount of $60.00 annually could be used to pay South Carolina Taxes.
- **Maturity Date:** the date at which the face value must be paid to the bond holder. This bond doesn't have a maturity date; I'm guessing it might have been issued before or during the Civil War.

Here's another Savings Bond**{Series of Next Slides}**

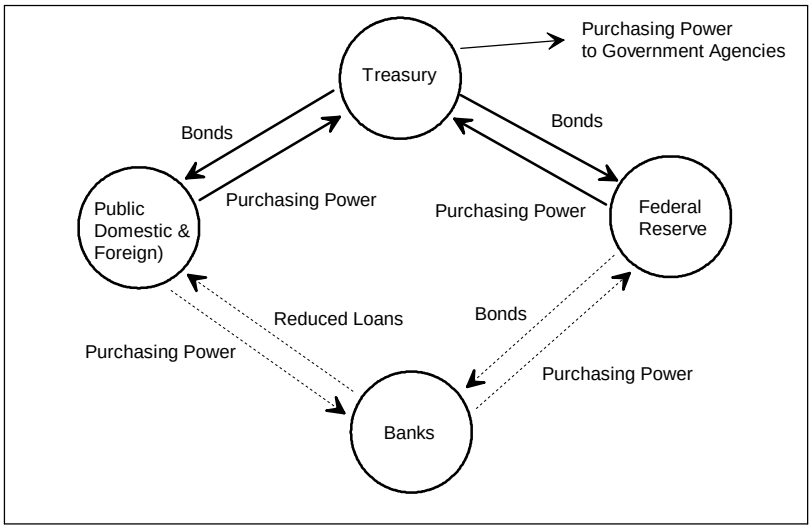


- This bond is a $500 (historical) savings bond issued by the U.S. Treasury.
- **Maturity Date:** This bond has a 30 year maturity date. The date of issue is added to the bond at the time of issue and sale.

The beautiful engraved bonds that one used to see have pretty much gone by the board. They are now generally issued electronically, and interest payments are made electronically to the bond holder of record.

If the U.S. Treasury sells it bonds (or bills) directly to the public, it is removing purchasing power directly from the public. This is non-inflationary, since the private sector reduction in spending will offset the increased government spending.

If, on the other hand, the Treasury sells its bonds to the Federal Reserve, the Fed has two choices: (1) it can turn around and sell the bonds to member banks who must reduce the loans they make to the private sector (households and businesses) in order to maintain their required reserve ratios. Again the private sector's ability to purchase goods and services is reduced so that the federal government can purchase more goods and services.***{next slide}***



(2) The Fed decides to increase the total amount of money (purchasing power) in the system. It creates $1 of

high-powered money for each dollar of Federal debt it buys. *This is what we mean when we say the "government" can "print" money*. In fact, it is not the "government" but the Federal Reserve that decides whether to finance the government deficit with more purchasing power, or to reduce the public's purchasing power while raising government's.

Increasing real high powered money has a multiplier effect on the nominal money supply and is likely to be inflationary. In fact, any fiscal policy measure that raises the **Natural Employment Deficit (NED)** $NED = G - t \cdot Y_n$ *the deficit when the economy is operating at the natural level of output)* has the power to be inflationary.

In any case, by borrowing to finance a deficit, the government runs the risk of reducing private spending directly, or indirectly by causing an inflation which reduces the *share* of private spending in total aggregate demand.

5 Monetary Policy & the National Economy

5.1 The Fed's Balance Sheet

Commercial bank reserves consist of vault cash and deposits at the Fed. The banks consider the two equivalent, since they can always use their deposits at the Fed to get more vault cash. These reserves plus the banks' loan portfolios make up the **assets** of the banking system. The

liabilities of the banking system consist of the value of all deposits in the banking system.

Now, the Fed has a balance sheet too. ***{next slide}***

Member Banks			Federal Reserve System		
Assets	Liabilities		Assets	Liabilities	
Vault Cash	Deposits	$2,495.9 Bil	U.S. Government Securities	Deposits of Member Banks	$2,689.8 Bil
Federal Reserve Account		$0.132 Bil	Other Loans incl. to Member Banks	Currency Held by the Public	$1,355.8 Bil
Loans		$18 .1 Bil	Gold + SDRs+Coins	U.S. Treasury Deposits	$44.2 Bil
		$1,744.1 Bil	Mortgage-Backed Securities	Foreign Official Deposits	$5.281 Bil
		$1.7 Bil	Bailout Securities	Other	$335.9 Bil
		$229.8 Bil	Other Assets	Total Liabilities	$4,430.98 Bil
		$4,489.7 Bil	Total Assets	Capital Accounts	$58.63 Bil

As of November 5, 2015

Actually, it supports itself just like a regular bank does. It earns interest off of its investments and this pays the operating expenses of the Fed. (Source:http://www.federalreserve.gov/releases/h41/Current/) ***{next slide}***

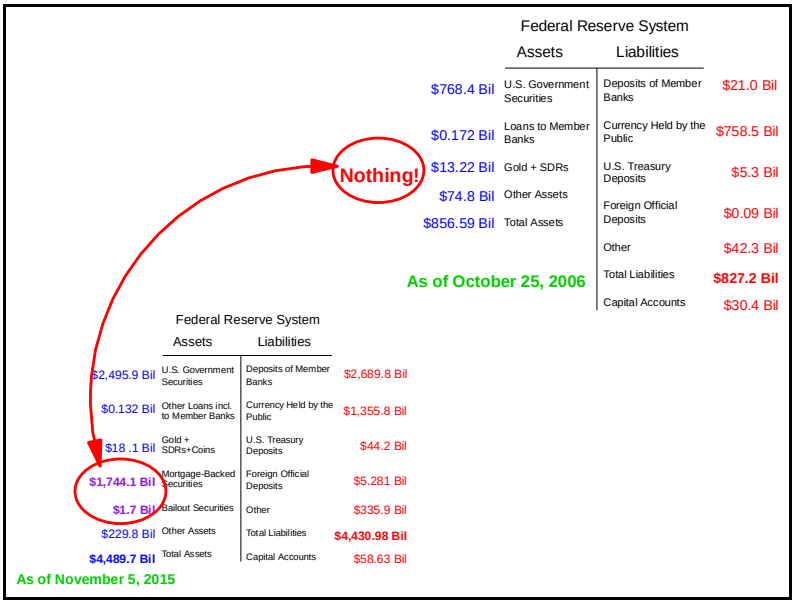
The Fed's assets on Nov 5, 2015, for example, included $2.495 trillion in U.S. Government securities (Treasury & other federal agencies), $0.132 billion in other loans (including to commercial banks; the Fed isn't disclosing these for fear of starting a run on banks), $1.75 ***trillion*** in what I'm calling toxic assets from Fannie Mae and Freddie Mac and other bailouts like Bear Stearns and AIG insurance, $18.1 billion in gold, SDR certificate and coins accounts, and $229.8 billion in "other assets" including the value of the Fed office buildings, etc. Total Assets were: **$4.489.7 Trillion**.

On the liability side, ***{next slide}*** are deposits of member banks at the Fed ($2,689.8 billion) on which no interest is paid, currency held by the public ($1,355.8.0 billion) again on which no interest is paid, U.S. Treasury deposits ($44.2 billion), Foreign Official Deposits ($5.281 billion) and other liabilities ($335.9 billion).

Note: The Fed can issue currency, which shows up as a liability on its balance sheet.

<<This means that the cash-holding public has a claim on the Fed ... what could it get for its cash if it stormed the front door?>> It beats me!

Now, I want you to see what the Fed's Balance sheet looked like in October of 2006, two years before the financial meltdown **{Next Slide}**



The comparison between these two balance sheets gives you a significant idea of the seriousness of the financial bailout undertaking by the U.S. Government and the Federal Reserve. The Fed bought

over $1.7 trillion in toxic assets. If these assets become worthless, the U.S. taxpayer will bear the cost. This is unprecedented in U.S. monetary policy history.

5.2 Policy Tools Available to the Central Bank (FED)

5.2.1.Open Market Operations

<<What happens when the Fed offers to sell treasury bonds to banks at a low price?>>

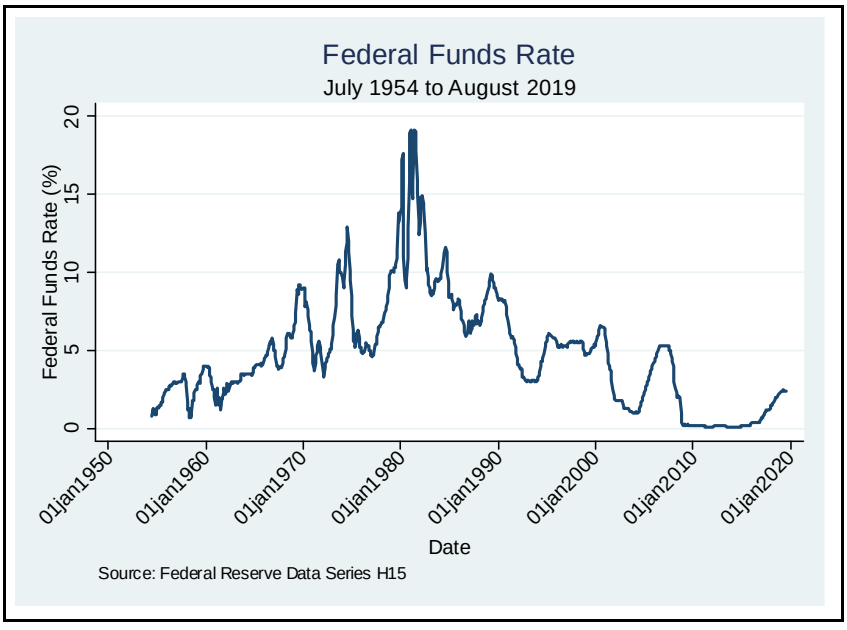
Banks buy them up because a low price means a high rate of return on the bonds, higher (adjusting for risk, of course) than they can earn on private loans; however, in order to do this, the banks must "write a check" to the Fed paying for the bonds. When this happens the composition of bank assets changes: They have increased their loans to the federal government and have reduced their cash reserves (either in the vault or their deposits at the Fed). In order to meet the reserve requirement they must reduce their loans to private borrowers. The fall in private loans reduces the size of bank deposits and total purchasing power in the economy (the "supply of money/credit") falls. The sale of, say, $100 billion in Government securities to commercial banks will reduce the total stock of money in the system by much more than that because of the **money multiplier.**

THIS SET OF TOOLS OF THE CENTRAL BANK IS COLLECTIVELY TITLED "**OPEN MARKET OPERATIONS**" ... Note ... you

need a very large government debt in order for open market operations to have a large quantitative impact on the aggregate money stock ... before 1930 the government debt was not large enough and open market operations were rarely utilized to any great effect.

When undertaking open market operations, the fed sets a target interest rate that it uses to measure the goals of its policy. It uses the **Federal Funds Rate** an interest rate that banks charge each other for overnight loans necessary to meet reserve requirements. The **Federal Funds Rate** is a short term interest rate that sets the standard for all other short term rates.

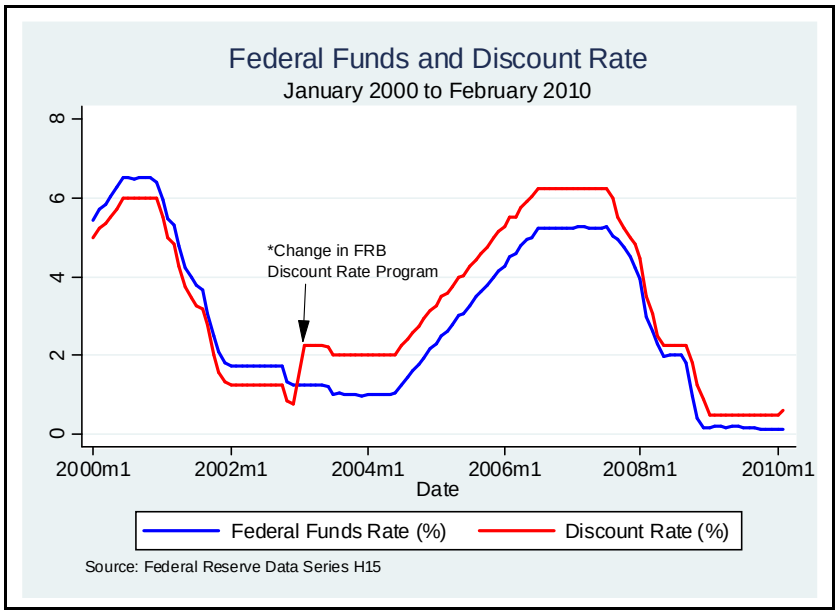
The following graph shows the history of the federal funds rate over about 50 years **{Next Slide}**



5.2.2.Changing the Discount Rate

What happens when the FED raises the loan rate (discount rate) it charges to commercial banks?>> Banks are discouraged from borrowing from the Fed and demand deposits are kept smaller than they otherwise would be. This policy tool is called the **"discount rate tool."**

Again, if the discount rate is low, banks are encouraged to borrow from the Fed, increase their reserves and make more loans. They can make these loans at lower interest rates because they have borrowed at a low rate from the Fed. So, both open market operations and the discount rate tool are used to raise / lower interest rates thereby lowering or raising the quantity of loans that the banking system can make. These tools are often used together as the following graph showing federal funds rates and discount rates in recent years indicates. **{Next Slide}**



5.2.3. Changing Reserve Requirements

We saw what would eventually happen if the required reserve ratio were cut from 0.20 to 0.10>>

$D = MMxR$

MM = money multiplier = $1/RR_r$

$\Delta D = \Delta MM \times R$

= $(1/.1 - 1/.2) \times R$

= $(10 - 5) \times R$

= $5 \times R$ and if $R = 100$

$\Delta D = 500$.

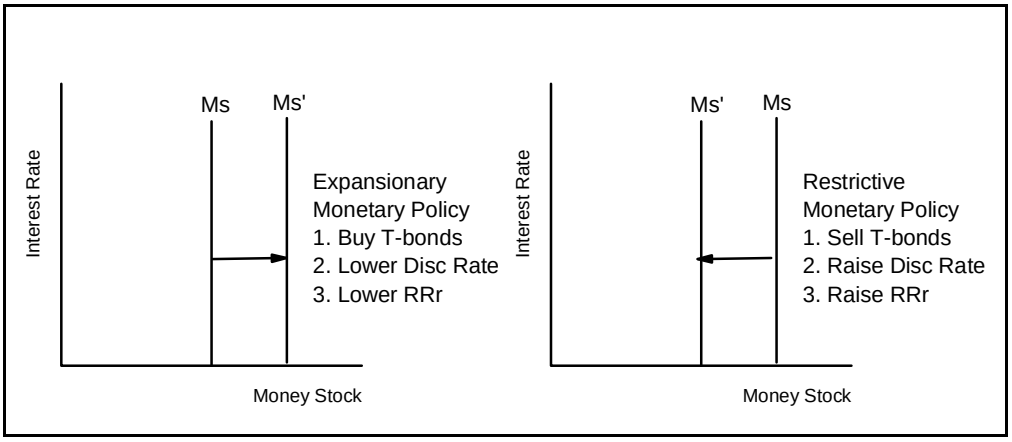
THEREFORE, BY RAISING OR LOWERING RESERVE REQUIREMENTS THE FEDERAL RESERVE CAN INCREASE OR DECREASE THE VOLUME OF DEMAND DEPOSITS

These are the 3 main monetary policy tools: **open market operations**, **discount rate,** and **reserve requirements.** The first, open market operations are by far the most widely used in the U.S. although not necessarily in other countries ... depends upon the size of their governmental debt. *This is one advantage of having a large government debt!!!*

Note also that the Federal Reserve Control *only the supply side of the money market.* Therefore, its control is not complete.

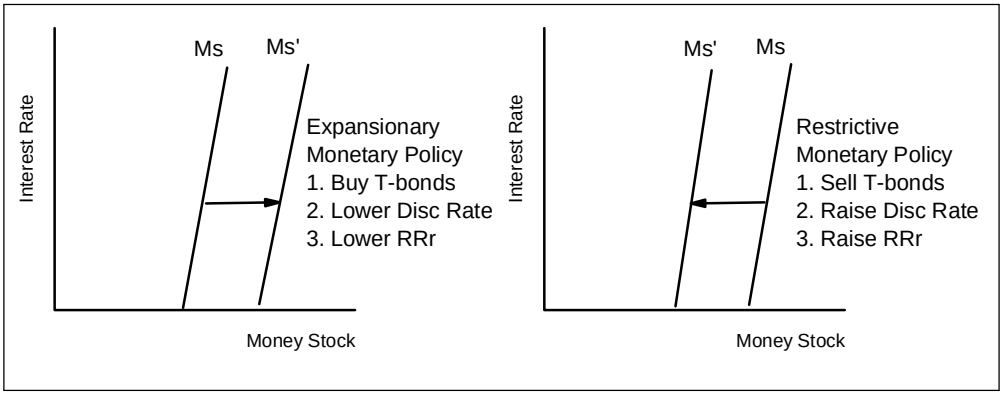
6 The Money Market

Through open market operations, reserve requirements, and lending to member banks control the position of the supply curve.

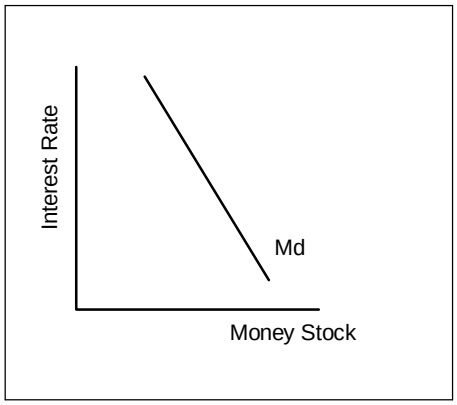


The Fed's control of the money supply is not as complete as it might seem. Banks, while they cannot reduce their reserves below the required reserve ratio can refuse to lend up to the maximum that they are allowed. In fact, banks like to lend up to the limit when interest rates are high and the economy is booming. On the other hand, in the midst of a recession when business prospects are poor and risks are high, banks tend to lend less than they are allowed. This means that the supply function for money is (slightly) upward sloping with respect to the interest rate. Hence, while the Fed controls the position of the Ms curve, it does not have total control of the money supply. We need to draw the money

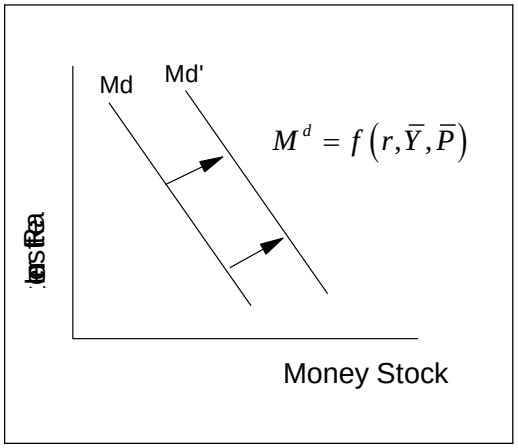
supply curve upward sloping as a result:



On the other side, households and businesses need to hold money to pay for economic transactions, but since money pays no interest (or low interest rates) there is an opportunity cost to holding money. Consequently, we expect the demand curve to slope downward with respect to the interest rate.

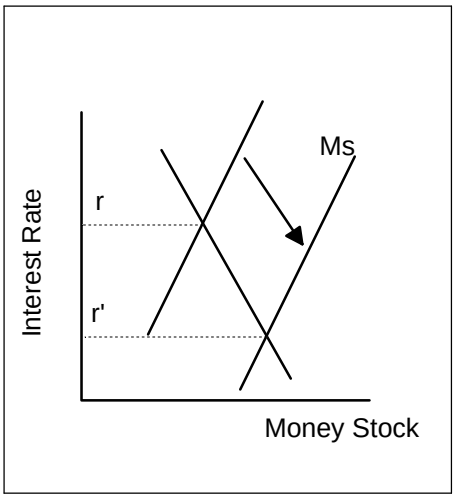


Two factors cause the money demand curve to shift: (1) the level of real income (output), and (2) the level of prices. As output rises the demand for money to finance the higher



volume of transactions rises; likewise, as prices rise more money is needed to finance purchases. Consequently, the demand curve for money will shift as the level of economic activity changes and as prices change $M^d = f\left(r, \bar{Y}, \bar{P}\right)$.

Equilibrium in the money market occurs at the intersection of the money supply and money demand curves. The Fed can affect the interest rate by shifting the MS function. By expanding the money supply the Fed can lower interest rates, and by lowering the money supply it can raise interest rates.



Remember: Money and Income are not synonymous. Money is a stock concept; it is measured at a point in time. Income is a measure of economic activity *over time.* Do not get them confused.

7 How Interest Rates Affect Total Expenditure

We have seen that the Fed can affect the interest rate in the money market, and this power has important consequences for the goods and services market. Previously we have argued that private spending, consumption and investment spending both depend on the interest rate:

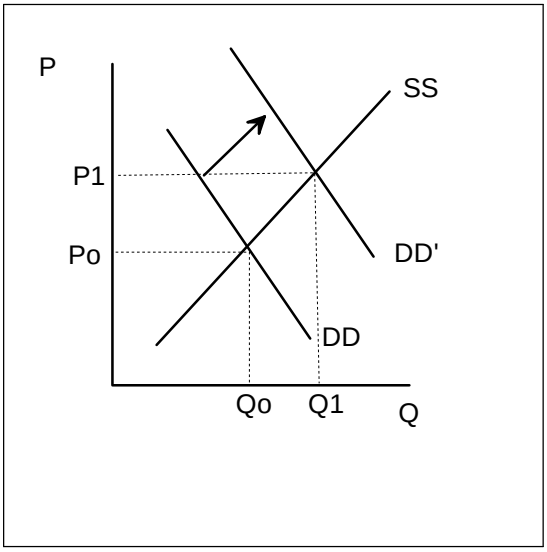
Consumption spending should be inversely related to the interest rate because (1) the opportunity cost of holding money in the face of high interest rates, and (2) the higher costs of borrowing for housing and auto purchases, and other consumer loans.

Investment spending is negatively related to the interest rate because business firms often have to borrow money in order to expand their plant and equipment.

Therefore, although we didn't emphasize it before, the $C + I + G$ line is also affected by the interest rate. As interest rates rise, the $C + I + G$ line falls, leading to a fall in equilibrium aggregate demand.

The effect of monetary policy on aggregate demand depends on the sensitivity of interest rates to the money supply, on the responsiveness of investment spending to the rate of interest, and on the size of the multiplier.

Finally, we should note that



the expansion of the money supply can shift the aggregate demand curve to the right. But, because of the upward sloping supply curve, expansion of GNP is often accompanied by a rise in prices. As prices rise, however, this reduces the purchasing power of money, and firms and households aren't as able to expand their purchases as they would have been in the absence of price increase. The mechanism is as follows:

At higher price levels, more money is demanded to finance transactions. Given a fixed money supply schedule, interest rates must rise; however, this causes private spending (particularly investment) to fall and, for a given level of real autonomous spending, the higher the price level the lower the level of aggregate demand. *Hence the Aggregate Demand Curve slopes downward.*