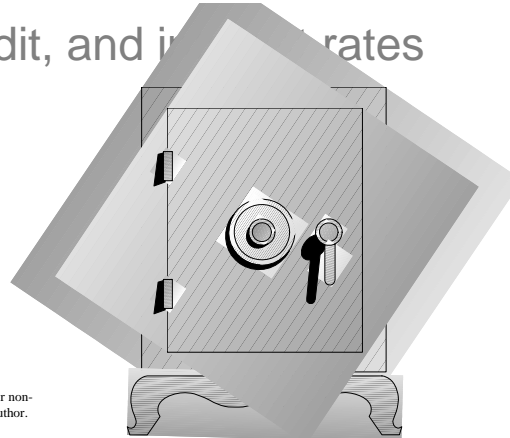


# Federal Reserve Policy

Money, credit, and interest rates



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## The objective of this 2-part lecture

- Introduce the Federal Reserve System
- Define Money and Credit and the connection
- Explain Open Market Operations
- Explain the connection between MS growth rates, interest rates, and interest rate targets
- Explain the long-term dangers of bad policy
- Explain what the FRS is doing now

## The Federal Reserve System (FRS)

- The Federal Reserve System is our nation's central banking authority.
- All nations have an equivalent (see <http://www.bis.org/cbanks.htm>) and the European Union has European Central Bank.
- The present Chair of the FRS is Ben S. Bernanke, who replaced Alan Greenspan.
- The operational branch of the FRS, responsible for controlling the money supply and influencing interest rates, is the **Federal Open Market Committee (FOMC)**, located at the Federal Reserve Bank of New York. They conduct open market operations.
- The FRS has the dual and sometimes conflicting mandate to **(1) promote price stability [prevent inflation]** and **(2) keep interest rates low**, and **(3) protect our financial system in times of crisis**.

## The FRS Mandate

(from their 1913 charter)

- |   |  |
|---|--|
| 1. Price moderation (typically anti-inflation policy in the modern era)   | Their primary policy tool for (1) and (2): <b>Open Market Operations</b> . |
| 2. Stimulate the economy as necessary                                     | For (3): The <b>Discount Window</b> and special actions.                   |
| 3. Prevent or mitigate financial crisis (act as "lender of last resort"). |  |

**Their primary job now.**

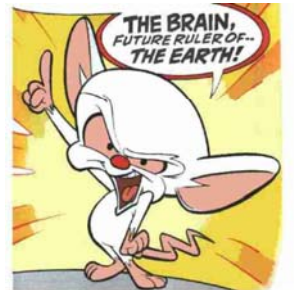


## What is money???



## Money doesn't exist, really .....

Economics ... is an information science, now that money itself is completing a development arc from matter to bits, stored to computer memory and magnetic strips, world finance coursing through the global nervous system. Even when money seems to be material treasure, heavy in pockets and ships holds and bank vaults, it always was *information*. Coins and notes, shekels and cowries were all just short-lived technologies for tokenizing information about who owns what.



*The Brain* (from *Pinky and the Brain*) knows that the ruler of the world will control his empire from a Droid X.

James Gleick, *The Information*.

## The textbook definition

- Any financial asset that can be used as
  1. a medium of exchange
  2. a store of value
  3. a means to settle debt (through payment)

"Legal tender" refers to circulating money that can be used to pay obligations to the government. In U.S. law, coins are not included.

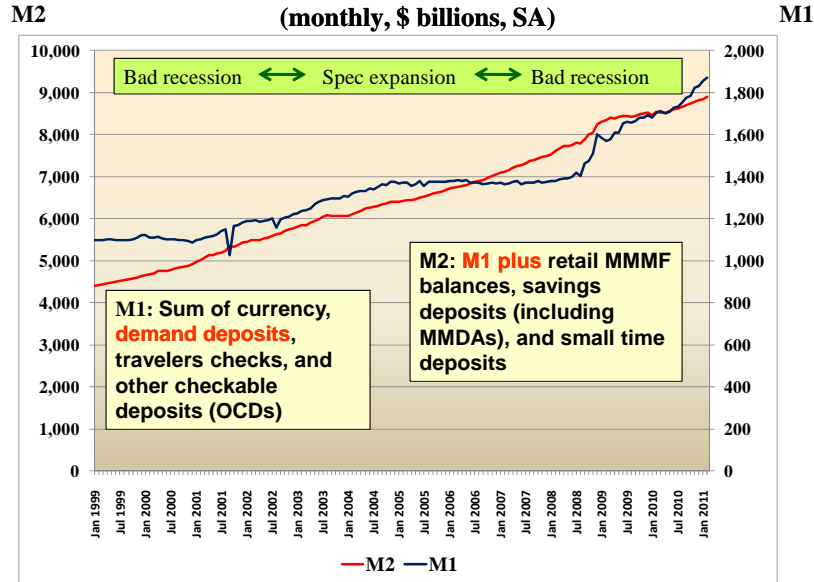
Most money today is in the form of bookkeeping transactions.

## The official money supply, FRS definitions

- **M1: Sum of currency, demand deposits, travelers checks, and other checkable deposits (OCDs)**
- **M2: M1 plus retail MMMF balances, savings deposits (including MMDAs), and small time deposits**



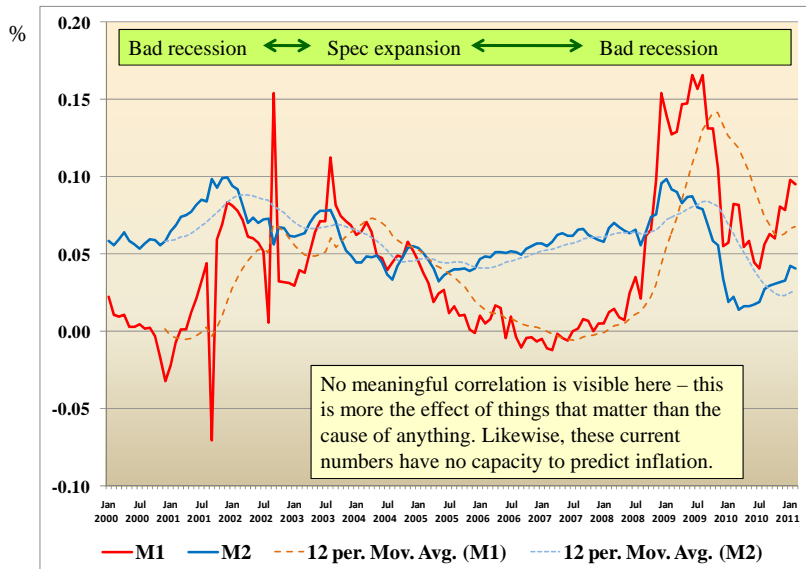
# Money Stock Measures, 2000 – 2011



Source: Federal Reserve Statistical Release H.6 Money Stock Measures

# Money Supply Growth Rates

Jan 2000 – Feb 2011, monthly, annualized previous 12 months, LN continuous, SA



Source: Federal Reserve Statistical Release H.6 Money Stock Measures

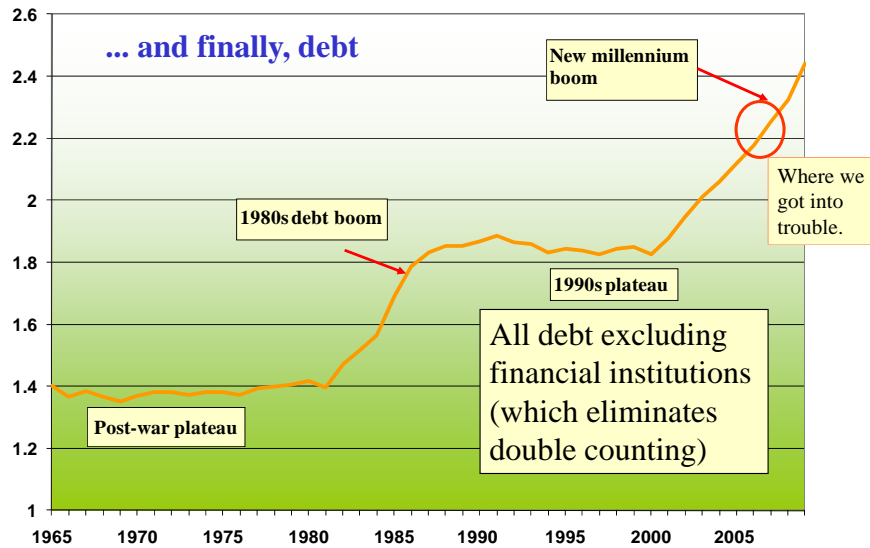
## The connection between money, credit, and debt

It has become increasingly apparent in recent years that efforts to control the "money supply" are less and less effective for at least three reasons: (1) it is very hard to define what constitutes money, (2) consumers and businesses rely less and less on their monetary holdings to finance their spending and in fact are reducing their monetary holdings in exchange for non-monetary financial assets and because they can use credit, and related to this, (3) the statistical correlation between money and spending, or deltas in money and spending, has largely vanished.

Increasingly credit and debt are seen as more strongly correlated with consumer and business spending.

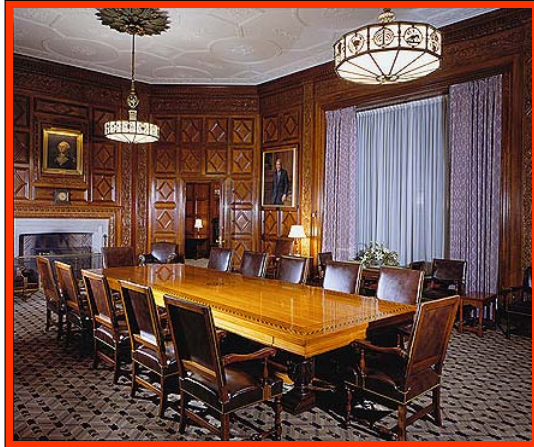
Credit is borrowed money. Credit is a flow variable and debt is the stock variable the results from credit accumulating over time. Mathematically, the net delta (change) in debt is equal to credit extended over any time period, such as one month. Debt is the balance, credit is the addition to the balance.

## Domestic Non-financial Debt/GDP 1960-2009



# Open Market Operations

A boardroom at the Federal Reserve Bank of New York, where **Open Market Operations** are conducted. This photograph is by Oleg March.



# OMO Targets

**Control variables**      **Target Variables**      **Goal Variables**



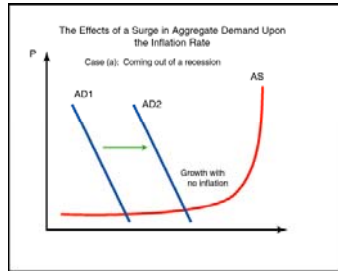
This channel is called the "**transmission mechanism.**"

Note the multiple target variables.

With goals, the real objective is to prevent or mitigate abnormalities or excesses, like high inflation, recession, or high interest rates.

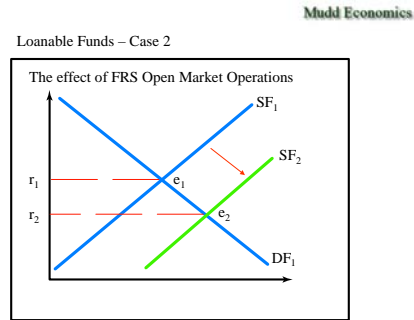
An enduring question for the Fed: **How strong and reliable is this connection?**

## Where we have seen this before ...



... in the aggregate supply/  
aggregate demand model  
(and Macrosim)

... and in the loanable  
funds model (and  
Macrosim)



## How Money and Credit are Created (through Open Market Operations)

1. FRB New York buys **U.S. Treasury securities** in the open market by bidding for them in competition with other potential buyers.
2. ... and pays banks with **reserves**,
3. ... which allows banks to expand their net lending,
4. ... which expands the **money supply** and the **level of credit** in the economy.

Important to understand: This process *creates money from nothing* and allows the *expansion of credit that is not financed by savings*.

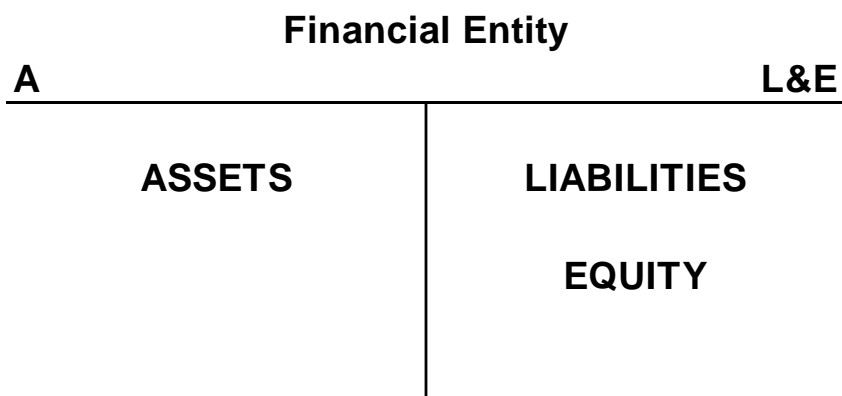
## The Open Market Operation (OMO) ... what you are about to see

The Federal Reserve System will purchase \$5 in government bills from the banking system (PBS) and will pay for them with reserves. This is done at the Federal Reserve Bank of New York.

This will give the PBS **Free Reserves** (also called **Excess Reserves**).

[Important note: The reserves discussed here are not the same as the Tier-1 capital reserves that banks are required to have to insure their solvency. Because of the credit crisis, these latter reserves were in the news extensively in 2008/9. Tier-1 reserves have nothing to do with OMOs].

Let's start with a simple accounting convention ...



Sarah	
A	L&E
\$2,000 cash	\$40,000 home loan
\$60,000 home	\$3,000 car loan
\$4,000 car	<b>Equity:</b> \$23,000

Bank of Claremont	
A	L&E
\$50 vault cash	\$500 checkable deposits
\$100 reserves	\$300 time deposits
\$350 govt bills	\$200 certificates of deposit
\$1,000 loans	\$200 federal funds
	\$300 equity

**All private banks (\$billions)**

<b>A</b>	<b>L&amp;E</b>
<b>\$10 Reserves</b>	<b>\$100 Checkable deposits</b>
<b>\$80 Loans</b>	<b>\$10 Equity</b>
<b>\$20 Govt Bills</b>	(checkable deposits are money)

**Federal Reserve System**

<b>A</b>	<b>L&amp;E</b>
<b>\$30 Govt Bills</b>	<b>\$10 Reserves</b>
	<b>\$20 Equity</b>

Federal Reserve System		All private banks (\$billions)	
A	L&E	A	L&E
\$30 Govt Bills	\$10 Reserves	\$10 Reserves	\$100 Checkable deposits
	\$20 Equity	\$80 Loans	\$10 Equity
		\$20 Govt Bills	(checkable deposits are money)

one and the same

All net new money and credit is created from nothing in this economy, and created in the private sector.

### How money is created PBS

A	L&E
+ 50 Loans	+ 50 Checkable Deposits

## The Reserve Requirement ... it's the law!!

All federally insured financial institutions are required to keep an amount equal to a specified percentage *of their deposit liabilities* at a Federal Reserve District Bank (or equivalent) in the form of reserves.

(Vault cash counts as reserves).

This is called the **Reserve Requirement**.

[Again, this is not the same as Tier-1 reserve requirements, so often in the news].

### Example ...

Reserve requirement = 10%

If Deposit Liabilities = 200, then

Required Reserves =  $200 \times .10 = 20$

The starting point .....

Federal Reserve System		All private banks (\$billions)	
A	L&E	A	L&E
\$30 Govt Bills	\$10 Reserves \$20 Equity	\$10 Reserves \$80 Loans \$20 Govt Bills	\$100 Checkable deposits \$10 Equity <small>(checkable deposits are money)</small>

Question: Can this banking system presently undertake any net new lending, given the reserve requirement?

The open market operation .....

Federal Reserve System		All private banks (\$billions)	
A	L&E	A	L&E
<del>\$30</del> Govt Bills 35	<del>\$10</del> Reserves 15 \$20 Equity	<del>\$10</del> Reserves 15 \$80 Loans <del>\$20</del> Govt Bills 15	\$100 Checkable deposits \$10 Equity <small>(checkable deposits are money)</small>

... the FRS bought \$5 in Bills and paid for them with \$5 in reserves. This created \$5 in **free reserves** also called **excess reserves**. Remember the importance of these.

With free (excess) reserves, the banks can now lend money ...

**All private banks (\$billions)**

A	L&E
<del>\$10 Reserves</del> <b>\$15</b> <del>\$80 Loans</del> <b>\$130</b> <del>\$20 Govt Bills</del> <b>\$15</b>	<del>\$100 Ch. Deposits</del> <b>\$150</b> <del>\$10 Equity</del> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>\$50 in new money has been created.</b> </div>

Note that both money has been created and new credit created.

**The Money/Credit Multiplier**

$\Delta$  Money Supply =  $(k) \times \Delta$  Reserves  
and

$\Delta$  Debt = Credit =  $(k) \times \Delta$  Reserves

where

$$k = \frac{1}{\text{Reserve Requirement}}$$

example:

$$k = \frac{1}{0.10} = 10$$

when the reserve requirement is 10%

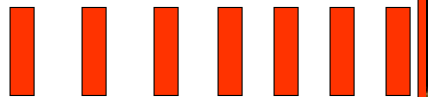


## Some very important qualifications

1. The example shown was exaggerated in size. The FRS makes a large number of small transactions throughout the year, turning this activity into a continuum.
2. For this to work, the FRS does not have to buy from a bank. They can buy from anyone.
3. For purposes of short-term interest rate stabilization, the FRS often conducts *reverse OMOs*, where they do the opposite of what was shown, and *sell* U.S. Treasury Securities
4. On net, though, they buy securities throughout the year, such that their target is a money supply *growth rate* rather than a money supply level, and that growth rate is *always positive!*

## Translate from discrete to fluid ...

not ...

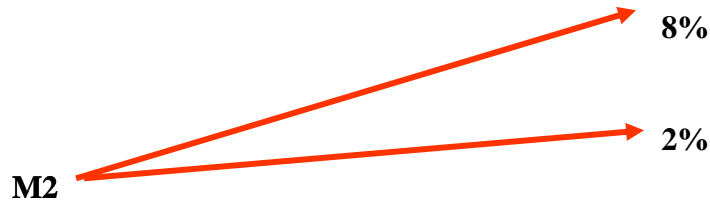


but ...



**i.e. a large number of small amounts throughout the year that should be thought of as a positive continuum.**

### ... what matters are positive ranges, not amounts



An 8% target might be seen as "expansionary" whereas a 2% target might be seen as "contractionary," and a reduction of 8% to, say, 6%, would be seen as a "tightening." Regardless, the growth is always positive. There is never an intended true contraction.

### Non-bank OMOs ... why they work

1. The FRS buys their security from a private party ... sends a green check.
2. That green check is deposited in a bank
3. That bank send the check to a FRS district bank for redemption
4. ... and is paid in reserves. Very important in 2009

... but given this, doesn't this mean that some banks at the end of the day will have excess reserves, whereas others will have a reserve shortage?? How do we solve this problem?

## The Federal Funds Market

... at the micro level

- ✓ At the end of the business day
  - ... some banks have excess reserves
  - ... some banks have reserve shortages
- ✓ The banks with excess reserves lend reserves to the banks with reserve shortages
  - very short-term loans, sometimes overnight
- ✓ The rate (annualized) at which reserves are lent is called the **Federal Funds Rate**.
- ✓ The effect?
  - it runs the system tight and gives the FRS effective control

## The National Federal Funds Market

Generally, funds are transferred from smaller retail banks to the nationals and from the interior to major money centers.



Regional Transfers

... this is why larger, aggressive banks don't have to entirely rely upon deposits.

## Borrowed Reserves: The Discount Window

Member banks also have the right to borrow reserves from their Federal Reserve District bank for short periods of time. The (annualized) interest rate paid is called the **Federal Reserve Discount Rate** and the process is called **Discount Window Borrowing**.

Despite the quaint name, the funds transfers are electronic ... there has not been a physical window for a long time.



Picture of teller's cage courtesy of *The Higgin's Museum of Money* in Okoboji, Iowa.

## Of interest ...

Large, aggressive international money-center banks do not need to rely upon their retail and commercial deposits for their lending. Why not? They can ...

1. Borrow from other banks in the interbank lending market, including Europe and Japan (and will pay an interest rate called the **London Interbank Offer Rate (LIBOR)**).
2. Borrow reserves from the Federal Funds Market as already described.
3. Through their non-bank subsidiaries, raise money in global capital markets and build CDOs, CMOs, etc.

However, if you lose deposits you lose reserves, so it is worthwhile to compete for deposits to some extent.