**CHAPTER 13**

**Money, Banks, and the Federal Reserve**

**Sasan Fayazmanesh**

---

**Summary**

This chapter deals with the following issues:

1) **Money**: what money is and what money does.

2) **Monetary system**: A nation's set of rules and regulations concerning money.

3) The **Keynesian concept of money** and its measurement.

4) **Financial intermediaries**, the **Federal Reserve System**, the **supply of money** and **the money multiplier**.

---

What is microeconomics?

**What is money?**

Economists often define money by its functions, rather than what it is.

This means "money is what money does."
(Sir John Hicks, *Critical Essays in Monetary Theory*)

---

It is usually argued that money has 3 functions:

1) Unit of account, standard or measure of value
2) Means of payment or medium of exchange
3) Store of value

---

**1) Money as a unit of account, standard or measure of value**

We need a **common denominator** to express the "**value**" or the "**worth**" of every commodity.

Money would do this job.

---

Theoretically, any commodity can act as a measure of value.

Such a commodity is called "money commodity" (or "commodity money").

Two commodities, however, have acted historically as "money commodity":

**gold and silver**.

---

The earliest known coins

Lydian coins (7th century)



Lydian electrum stater

Minted around 600 B.C. in Lydia, Asia Minor (current-day Turkey)

---

Other early coins

Persian coins



Minted under the authority of Cyrus the Great in 522-515 BC, in Sardes, Lydia under Persian rule

---

Greek coins



Macedon Empire, Alexander the Great (336-23 BC),
tetradrachm after c. 330 BC, mint Aegina
Obverse: head of Heracles with lion skin r.
Reverse.: Zeus with eagle and sceptre enthroned

---

The Roman Period (from 27 B.C. – 476 A.D.)

Roman coins



Nerva (96-98 AD)

---

What are the specific properties of gold and silver that made them money commodities?

According to some economic thinkers, the properties are:

1) **Portability** (**easy to carry**)
2) **Divisibility** (**easy to divide**)
3) **Durability** (**non-perishable**)

**2) Money as a medium of exchange or means of payment**

- Money is used to circulate commodities or to pay for commodities.

- Money facilitates exchange.

- This is opposed to **barter**, where commodities are exchanged directly.

---

Some economists argue that **barter is difficult**.
Why?

Because in barter

- It is difficult to match wants: "**double coincidence of wants**."

- It is difficult to keep track of **numerous exchange ratios**.

- It is difficult to **divide some commodities**.

---

**3) Money as a Store of Value**:

Money is **an asset** like any other assets, such as jewelry, paintings, and real estate.

As such, money can be stored or **hoarded** like any other asset.

---

## Monetary System or Monetary Standard

Def**. Monetary standard**: monetary standard refers to a set of rules and regulations concerning unit of account and means of payment.



---

**Different Types of Monetary Standards**

Historically there have been two types of monetary standards:

1) **Commodity standard**: where money (either coins or paper money) **can be converted** to gold and silver.

2) **Fiat standard**: where money **cannot be converted** to gold or silver.

---

**Commodity standard falls into two types**

1) **Bi-metallism**:

Money can be converted to gold and silver

2) **Mono-metallism**:

Money can be converted into one metal only, usually gold.

This is the case of **gold standard**.

**Problems with bi-metallism :**

The most important problem:

The government must fix the relative values of the two metals.

But these values change in the commodity markets.

---

Example: Suppose

in the US: 15 oz silver is set equal to 1 oz gold and

in England: 15.5 oz silver is set equal to 1 oz gold.

What happens to gold in the US?

It will disappear!

This is called the "**Gresham Law**": "bad money derives out good money."

---

**Problems with the gold standard**

• The government must fix the value of gold, but this value changes in the commodity markets.

• The amount of money in the country changes, as gold increases or decreases.

• The availability of credit changes, as gold increases or decreases.

---

**Some Major Events in the Monetary History of The US**

Colonial–1790: Each colony had its own form of pound, the value of which differed.

1790 (after Constitution went into effect): Congress designated the unit of value, the dollar.

1792: US adopted bimetallism.

---

1791-1811: The first national bank—called the **First Bank of the United State**s—was **chartered** by the US government. Its charter ran out in 1811 due to political reasons, such as fear of big banks.

1816-1836: The **Second Bank of the United States** was chartered. Its charter ran out in 1836.

1836-Civil War (1863): **Free-banking period**, or **wildcat banking**, when states could charter their own bank and issue their own notes.

---

1863 and 1864: National Banking Act ended the free banking system and created a dual banking system, where banks could be chartered either by federal or state government.
It also created the Office of the Comptroller Currency to charter federal banks and issue uniform money.

1907: A major financial panic ("**rich man's panic**") occurred, necessitating the creation of a central bank. Work on such a system began.

 1900-WW1: Gold Standard Act passed, which officially ended bimetallism. $20.67 was set equal to 1 oz of gold.

1913: The Federal Reserve System, the central banking system of the US was established.

1933: The banking system nearly collapsed and Franklin D. Roosevelt declared a bank holiday.

1934: The convertibility of paper money into gold officially came to an end.

---

1944: At Bretton Woods Conference a new gold standard, the "Gold-Exchange Standard," was established. Dollar became fixed at $34 per oz gold. But this was strictly for fixing the international currency.

1971: The Gold-Exchange Standard came to an end, when the Nixon Administration allowed the dollar to float in the international money markets.

---

**Keynesian Concept of Money**

In Keynesian economics money is viewed as:

The most liquid asset.

Def. Liquidity means easy exchangeability.

---

The above concept combines the two functions of money:

1) money as a medium of exchange,
2) money as a store of value.

---

**Examples of Money**

**1) Cash or currency**



**2) Demand deposit**

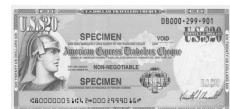Def. **Demand Deposit**: Checking accounts that pay no interest.



---

**3) Other checkable deposits**

Def: **Other checkable depo**sits: those checks that earn interest but one can write unlimited number of them.



Example: **Negotiable orders of withdrawal** accounts (NOWs): large checking accounts that pay interest.

**4) Travelers' checks**

**Near Money**

A second term used by Keynesians is "near money":

Def. **Near money**: An asset which can easily be converted into money without any change in value.

---

**Examples of Near Money**



- Savings account

- Small time deposits: Certificates of deposits (CDs) that are less than $100,000.



---

- Money market deposit accounts (MMDAs)

    Def. MMDAs: Interest earning checking accounts with limited check writing ability.

- Balances in individual money market mutual funds:

    These are customer deposits at money market mutual funds that can be withdrawn by writing a check.

---

**Are credit cards money or near money?**

**No!**

**Why not?**

Because credit cards are **not your assets**.

They are forms of borrowing.



---

**The Monetary Aggregate**

The Federal Reserve System uses the concepts of money and near money to measure monetary aggregates:

    M1 = currency + demand deposit + other checkable deposits + travelers' checks.

---

M2 = M1 + savings deposits + small (<$100,000) time deposits) + money markets deposit accounts (**MMDAs**) + balances in individual money market mutual funds + . . .

See your course website for the latest numbers of M1 and M2:

http://www.federalreserve.gov/releases/h6/Current/

M3 = M2 + large (>$100,000) time deposits +
     balances in institutional money market mutual
     funds + . . .

L = M3 + Short term Treasury Bills + . . .

---

**Financial Intermediaries**

What are financial intermediaries?

   Def: **Financial intermediaries**: Those institutions
   that intermediate between lenders and borrowers.

---

There are two types of financial intermediaries :

1) Depository institutions: Those institutions that accept
   deposits and lend money, such as commercial banks.

2) Non-depository institutions: Those institutions that
   collect fees and premiums in exchange for services
   and lend money.

   Examples:  Insurance companies, pension funds,
   money market funds and finance companies.

   These institutions do not concern us in this course.

---

**Depository Institutions**

   Depository institutions fall into 4 categories:

---

**1)  Commercial banks**: These are the largest
   institutions of their kind.

   They issue checkable deposits, time deposits,
   savings deposits and lend money to commercial
   firms and consumer (consumer loans and
   mortgages).

   The first modern bank
   in the US was the **Bank
   of North America**
   chartered in 1781 in
   Philadelphia.

---
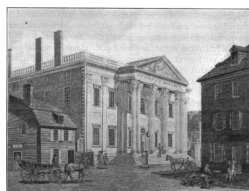
**2) Mutual Savings Banks**: First
established in 1816.

These institutions are similar to S&Ls.

They are primarily on the East Coast
and call their deposits "**shares**."

As such, unlike S&Ls, they are owned
by the depositors.

Philadelphia Savings Fund
Society 1816

**3) Savings and Loan Associations** (S&Ls): First established in 1831.

These institutions are primarily on the West Coast and engage in mortgage lending.

Nowadays, they work very much like a bank and their sources of fund are the same as the banks.

Oxford Provident
Philadelphia 1831

---

**4) Credit Unions**: First established in 1908.

These institutions cater to a special group of people, such as union members.

They **are non-profit**, **tax exempt cooperatives** and make consumer loans and mortgages.

New Hampshire St. Mary's Credit
Union 1908
(New building 1930)

---

# Commercial Banks

Commercial banks are corporations that are owned by their **shareholders**.

They make profit by charging **interest** on loans and customers **fees** for services.

---

**Required Reserve**

Banks are required to hold a minimum amount in reserve against their demand deposits. This is **called required reserve (RR)**.

> Def. **Required reserve (RR)**: the minimum amount of reserve that banks are required to keep—either in vault cash or with the Federal Reserve System—against demand deposits.

---

The minimum amount is a fraction of demand deposit and it is called **required reserve ratio (r)**:

> Def. **Required reserve ratio (r)** is the ratio of required reserve to demand deposits: $r = RR/ DD$.

Currently **r =10%.**

This means that for every $100 in demand deposits banks are required to keep $10 in reserve.

This rate is "uniform" and "universal."

---

**Excess Reserve** and **Total Reserve**

If a bank decides to keep more the then the required reserve, the extra amount is called excess reserve (**ER**).

> Def. **Excess reserve** (**ER**): is the amount over and above minimum reserve that banks may decide to keep.

Total reserve is the sum of the two reserves:

> Def. **Total reserve** (**TR**): **TR =RR +ER**

**Balance sheet**

Every commercial bank has a balance sheet.

> Def. **Balance sheet**: a list of assets, liabilities and net worth.

> Def. **Assets** are valuable things that the bank owns.

Def. **Liabilities** are valuable things that the bank owes.

Def. **Net worth** or **capital** is the difference between assets and liabilities:

**Net worth = Assets – liabilities**

---

Example:

| Bank X | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Cash | $5 | Demand deposit | $200 |
| Reserves with Fed | $15 | | |
| Loans | $180 | | |
| Securities | $50 | | |
| | | | |
| Total | $250 | | |

---

Example:

| Bank X | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Cash | $5 | Demand deposit | $200 |
| Reserves with Fed | $15 | | |
| Loans | $180 | | |
| Securities | $50 | Net worth | $50 |
| | | | |
| Total | $250 | | $ 250 |

Q: assuming no excess reserve, what is the required reserve ratio for Bank X?

---



The Federal Reserve System

An Overview

---

A brief look at the central bank of the US, the Federal Reserve System (Fed)

- • History
- • Functions
- • Structure
- • Monetary policy

History

Repeated monetary crisis in the US (1873, 1883, 1893, and 1907) led to the formation of a bipartisan Congressional body in 1908, the National Monetary Commission, whose report set the stage for the **Federal Reserve Act of 1913**.

The Fed, however, proved to be powerless to prevent bank failures during the Great Depression.

Runs on the banks were common in this period.

Definition: A run on the bank is when people try to withdraw their deposits on mass in a panic.



- Between 1929-33 nearly 11,000 bank failed in the US. This led to declaration of the "bank holiday" by Roosevelt in 1933.

- Subsequently, the Banking Act of 1933 (Glass-Steagall Act) reformed the banking system.

- Among the reforms was the creation of FDIC (Federal Deposit Insurance Corporation).

- This, and subsequent act (1935), also gave greater responsibilities to the Fed, i.e., the functions that we see today.

Can it happen again?



IndyMac

Pasadena, California
July 14, 2008

THE FED'S FUNCTIONS TODAY

1. Formulating and implementing the monetary policy

2. Facilitating payments mechanism

3. Regulating and supervising the financial system

4. Acting as fiscal agent of the government

---

Formulating and implementing the monetary Policy

Def Monetary policy: policies pursued to manage the supply of money and the interest rate in order to dampen the effect of business cycle.



---
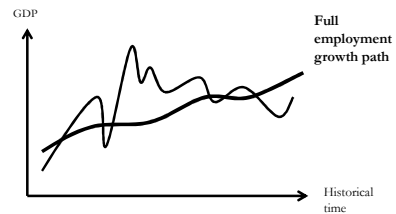
This means:

1. Decreasing interest rates in times of recession.

2. Increasing interest rates in times of inflation.

3. Keeping an eye on the long term growth and stability of the economy.

---

Facilitating payments mechanism

• The Fed provides currency that the Bureau of Engraving and Printing (part of the Department of Treasury and located in Washington, DC and Forth Worth, Texas) has printed.

• It clears checks for the member banks.

---

Regulating and supervising the financial system

The Fed regulates the financial system by enforcing certain rules. Examples are:

Regulation A: "Extensions of Credit by Federal Reserve Banks "

Regulation D: "Reserve Requirements of Depository Institutions"

See Regulations (Direct Internet)

---

In addition to these, the Fed does such things as:

• Inspecting banks' books to insure safety,

• Allowing or disallowing mergers,

• Protecting consumers against unlawful acts (for example, discrimination in lending, false advertising, etc.).
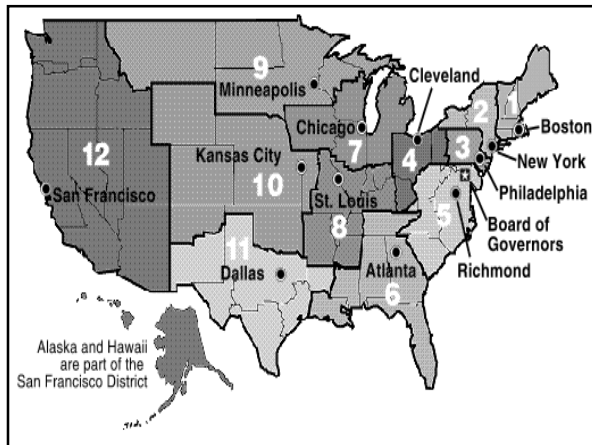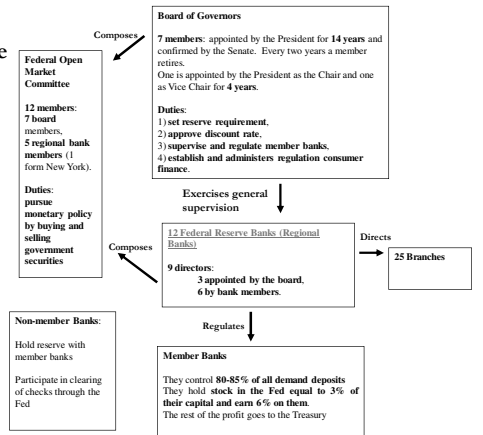
Acting as fiscal agent of the government

The Fed is the banker of the US government.

It takes deposits of all tax collections and it makes Treasury's payment.

It assists the Fed in buying and selling government securities.

---

**The Structure of the Fed**

**Board of Governors**

**7 members**: appointed by the President for **14 years** and confirmed by the Senate. Every two years a member retires.
One is appointed by the President as the Chair and one as Vice Chair for **4 years**.

**Duties**:
1) **set reserve requirement**,
2) **approve discount rate**,
3) **supervise and regulate member banks**,
4) **establish and administers regulation consumer finance**.

Composes

**Federal Open Market Committee**

**12 members**:
**7 board members**,
**5 regional bank members** (1 form New York).

**Duties**:
**pursue monetary policy by buying and selling government securities**

Exercises general supervision

**12 Federal Reserve Banks (Regional Banks)**

**9 directors**:
    **3 appointed by the board**,
    **6 by bank members**.

Composes

Directs → **25 Branches**

**Non-member Banks**:

Hold reserve with member banks

Participate in clearing of checks through the Fed

Regulates

**Member Banks**

They control **80-85% of all demand deposits**
They hold **stock in the Fed equal to 3% of their capital and earn 6% on them**.
The rest of the profit goes to the Treasury

---

9 Minneapolis
Cleveland
Chicago
12
Kansas City
7
4
2
3
Boston
New York
San Francisco
10
St. Louis
8
5
Philadelphia
Board of Governors
11
Dallas
Atlanta
6
Richmond

Alaska and Hawaii are part of the San Francisco District

---

Monetary Policy:
Managing the Supply of Money

---

Open Market Operation

This is the most important and often used policy by the Fed. It involves selling and buying of government securities:
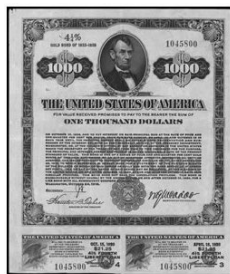
Fourth Liberty Loan Bond 1905

---

Buying government securities results in an increase in the supply of reserves.

Selling government securities results in a decrease in the supply of reserves.



Changing The Required Reserve Ratio

The Fed sets the reserve requirement ratio, i.e., how much reserve do the depository institutions need to keep against demand deposit liabilities.
Currently, the rate is 10%.

---

Changing the Discount Rate:

Banks can borrow from the Fed when they are short of reserves at a discount rate:

Def. The discount rate is the rate that Fed charges member banks when borrow from the "discount window" for such things as inadequate reserves.

The Board of Governors can change this rate at any time.

---

The banks can borrow from the other banks.

The rate at which they borrow is called "fed funds rate," which is now lower than the discount rate.

Def. Fed funds rate: the rate at which banks can borrow reserves from each other.

This rate is targeted by the Fed.

---

Press Release, October 25, 2006
Press Release, August 17, 2007
Press Release, October 31, 2007
Press Release, November 1, 2007
Press Release, January 22, 2008
Press Release, October 8, 2008
Press Release, October 29, 2008
Press Release, December 16, 2008 *
Press Release, January 28, 2009
Press Release, March 18, 2009
Press Release, November 4, 2009
Press Release, February 18, 2010 *
Press Release, March16, 2010

---

Summary
The tools of monetary policy are:

1) Open market operation (OMO)
2) Changing the reserve requirement ratio
3) Changing the discount rate

Of course, the Federal Reserve has other tools, such as "moral suasion" and "Special Credit Control."

But the most important tool is OMO, which needs further consideration.

## Open Market Operations and the Money Multiplier

---

**The Fed Buys Government Securities**

Let us assume the following:

- The reserve ratio, **r**, is 1 to 5 or **20%**

- Banks are "l**oaned up**": they keep **no excess reserves**

- There is no "**leakage**" into cash: no one cashes a check

- Fed **buys $1000** in securities from a "dealer," and the dealer deposits the Fed check in Bank 1.

---

| Bank 1 (Balance Sheet) | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Total Reserves | $1000 | Demand deposit (dealer) | $1000 |
| | | | |
| | $1000 | | $1000 |

---

| Bank 1 | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Required Reserve | $200 | Demand deposit | $1000 |
| Excess Reserve | $800 | (dealer) | |
| | $1000 | | $1000 |

Bank 1 will lend excess reserve to **Smith**, and **Smith** deposits check in Bank 2.

---

| Bank 1 | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Required Reserve | $200 | Demand deposit | $1000 |
| Loan (Smith) | $800 | (dealer) | |
| | $1000 | | $1000 |

---

**Intermediate step in the textbook**

| Bank 1 | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Total Reserve | $1000 | Demand deposit | $1000 |
| Excess Reserve | −$800 | (dealer) | |
| Loan (Smith) | $800 | | |
| | | | |
| | $1000 | | $1000 |

| Bank 2 (Balance Sheet) | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Total Reserves | $800 | Demand deposit (Smith) | $800 |
| | | | |
| | $800 | | $800 |

| Bank 2 | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Required Reserve | $160 | Demand deposit | $800 |
| Excess Reserve | $640 | (Smith) | |
| | | | |
| | $800 | | $800 |

Bank 2 will lend excess reserve to **Jones**, and **Jones** deposits check in Bank 3.

| Bank 3 (Balance Sheet) | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Total Reserves | $640 | Demand deposit (Jones) | $640 |
| | | | |
| | $640 | | $640 |

| Bank 3 | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Required Reserve | $128 | Demand deposit | $640 |
| Excess Reserve | $512 | (Jones) | |
| | | | |
| | $640 | | $640 |

Bank 3 will lend excess reserve to **Brown,** and **Brown** deposits check in Bank 4, **etc!**.

**You get the idea!**

**The process goes on indefinitely.**

**A number of geometric series are at work.**

**The Net Result: Increase in demand deposits** (DD)

$\Delta$DD = $1000+ $800+ $640+ $512 + $409.6 + . . .

$\Delta$DD = $1000+ $1000 (8/10)+ $1000 (8/10)$^2$ + . . .

$\Delta$DD = $1000/(1-8/10) = $1000/(2/10) = **5** x $1000

**$\Delta$DD = $5, 000**

Remember:

$S = a + ar + ar^2 + ar^3 + ar^4 + . . . = a/(1-r)$

**The Net Result: Increase in money supply (M)**

Since M = Cash +DD,
then

$$\Delta M = \Delta Cash + \Delta DD$$

Since $\Delta Cash = 0$, then

$$\Delta M = \Delta DD$$

$$\Delta M = \$5,000$$

---

**The Net Result: Increase in Loans**

$\Delta Loans = \$800 + \$640 + \$512 + \$409.6 + . . .$

$\Delta$**Loans = \$4,000**

---

**The Net Result: Increase in Required Reserves**

$\Delta$ Required reserves $= \$200 + \$160 + \$128 + \$ 102.4 + . . .$

$\Delta$ **Required reserves = \$1, 000**

---

Note:

$\Delta$ **Demand Deposits** $= \Delta$**Loans** $+ \Delta$ **Required Reserves**

$\$5000 \qquad = \$4000 + \$1000$

---

**Algebraic View of Money Multiplier**

Consider the definition of the required reserve ratio:

$$r = RR/ DD$$

$$DD = RR/r$$

$$\Delta DD = \Delta RR/r$$

Or

$$\Delta DD = (1/r) \ \Delta RR$$

**We call 1/r the money multiplier**.

---

Our previous example:

r = 20 %

Fed buys \$1000 in government securities:

Money multiplier is $1/r = 1/20\% =$ **5**

$\Delta M = \Delta DD = (1/r) \ \Delta RR = 5 \times \$1000 = \$5,000$

Another example:

r = 10 %

Fed buys $1000 in government securities:

Money multiplier is $1/r = 1/10\% = 10$

$\Delta M = \Delta DD = (1/r)\ \Delta RR = 10 \times \$1000 = \$10,000$

---

Another example:

Suppose

r = 0 %!

Fed buys $1000 in government securities.

What happens to the money supply?

$\Delta M = \Delta DD = (1/r)\ \Delta RR = \$1000/\ 0 = $ Infinite!

---

With r=0%, even if the Fed buys an infinitesimally small amount in government securities, the supply of money increases infinitely.

That is why we have "fractional reserve system":

Def fractional reserve system: any system that requires a fraction of demand deposit to be kept in reserve.

---

**The Fed Sells Government Securities**

With the same assumptions as before:

- The reserve ratio, **r**, is 1 to 5 or **20%**
- Banks are "l**oaned up**": they keep **no excess reserves**
- There is no "**leakage**" into cash: no one cashes a check

Fed **sells $1000** in securities to a "dealer," and dealer writes a check issued by Bank 1.

---

| Bank 1 (Balance Sheet) | | |
|---|---|---|
| **Assets** | | **Liabilities** |
| Total Reserves | −$1000 | Demand deposit (dealer) −$1000 |
| | | |
| | −$1000 | −$1000 |

But Bank 1 had **$200 in required reserves with Fed**. The bank is only **short of $800**.

---

| Bank 1 | | |
|---|---|---|
| **Assets** | | **Liabilities** |
| Required Reserve | −$200 | Demand deposit −$1000 |
| Loan (Mc George) | −$800 | (dealer) |
| | − $1000 | − $1000 |

Bank 1 could **call up Mc George's loan**. We have a reverse process.

**The net result?**

$\Delta M = \Delta DD = (1/r) \ \Delta RR = -\$1000/20\% = -\$5000$

$\Delta Loans = -\$4000$

$\Delta Required\ reserves = -\$1000$

Next stop: Chapter 12!