The Money Supply Process – Hubbard, Chap 17.

Key Points

1. Understand the roles of the Fed, banks, and households in the money supply process.

2. Definition of the **monetary base**.

3. U.S. banking system is a **fractional reserve system** – permits multiple deposit creation.

4. Deriving the simple money multiplier.

5. Modifications to money multiplier due to:
   - bank behavior
   - household behavior

6. Instablility in monetary aggregates and velocity.

I. Definitions and Accounting

Focus on the money supply – How is this defined?

Money – A **Generally Accepted Medium of Exchange**

But – What should we use:

Liquidity →

Human Capital	**House**	**Savings Accounts**	**Checkable Deposits**	**Currency**

Different **Monetary Aggregates** that differ in liquidity:

M1	M2	M3	Credit extended to (debt owed by)
Currency (and travelers checks)	M1	M2	Federal government
Demand deposits	Savings deposits and money market deposit accounts	Large time deposits	State and local governments
NOW and similar interest-earning checking accounts	Small time deposits[1]	Wholesale-type money market mutual fund balances	Households
	Retail-type money market mutual fund balances	Term (beyond overnight) RPs	Nonfinancial businesses
	Overnight repurchase agreements (RPs)	Term Eurodollars	
	Overnight Eurodollars		

We first look at M1 – want to understand the role of

$$\left.\begin{array}{c} Fed \\ Banks \\ Households \end{array}\right\} \Rightarrow Money\ \ Supply$$

To understand the Fed's role, begin with simplified **Balance Sheet**

Assets	Liabilities
U.S. Govt. Securities	Currency in circulation (C)
Discount Loans	Reserves (R)

Reserves – deposits by banks at the Fed and vault cash.

Divide reserves into two categories:

$$R = \underbrace{RR}_{required\ reserves} + \underbrace{ER}_{excess\ reserves}$$

required reserves – banks must hold a fraction of their deposits as reserves – **required reserve ratio (rrr)**

Important Point – required reserves are a tax on bank profits.

To obtain \$1 to lend, bank needs $\$\frac{1}{1-rrr}$ in deposits. If the interest rate on deposits is i_d, then the cost of loans is $\frac{i_d}{1-rrr}$.

The liabilities of the Fed are defined as : **monetary base (B) = C + R**

Because of balance sheet – any change in assets implies a corresponding change in **B**.

Change in securities – **open market operations**

or **Discount Loans**

First examine Open Market Operations – T-accounts.

There are two ways to change assets:

a. Open Market Operations
b. Discount loan changes assets and therefore change base.

A. T account (abbreviated balance sheet) records assets and liabilities that are changing

1. Open Market Operations

example: the fed purchases $1M in securities from a bank. S = securities

The Fed	
S + IM	R + IM

Wells Fargo	
S – IM	
R + IM	

Reserves ↑ IM, therefore **Base** ↑

example: suppose they buy securities from public, not bank.
CD = checkable deposits

The Fed	
S + IM	R + IM

The Public	
S –IM	
CD + IM	

BofA	
R + IM	CD + IM

but…the public has a choice. Suppose the public wants half in checking and half in savings.

The Fed	
	R -.5M
	C + .5M

The Public	
C + .5M	
CD - .5M	

BofA	
R - .5M	CD - .5M

When the Fed conducts Open Market Operations, it cannot control the reaction of the public. It controls B but not the composition of B. When ever cash is held (currency↑) then some is leaked out of the banking system. Fed can't control leakage component. The same kind of situation also goes for discount loans.

B. Discount Window

Money in banks is callable, or in other words at any point in time that you want your money, you can go and withdraw it from the bank. If a bank is in trouble (1. going bankrupt, or 2. can't meet liquidity demands) then no other banks will lend to them b/c they might not get paid back. However, the Fed will lend to them at a rate typically lower than the fed funds rate. The Fed discourages discount window lending – the discount rate is an **administered rate.**

Discount Window – Loans are <u>administered</u> by the Fed – borrowing is discouraged. Again, convenient to divide reserves into two categories:

$$R = \underbrace{NBR}_{non-borrowed\ reserves} + \underbrace{BR}_{borrowed\ reserves}$$

Bank behavior can determine ***BR***.

C. Simple Money Multiplier

When a bank sells securities to the Fed, they get reserves which earn no interest. Why would profit driven banks do this? They'll take the reserves and loan them out, expanding lending activity.

Assume rrr = required reserve ratio = .10

example: Fed buys 100,000 in securities from BofA and BofA makes a loan to CalGene.

1. Open Market Operation

BofA

S – 100,000 R + 100,000	

2. Loan

BofA

Loan + 100,000	CD + 100,000

Balance Sheet at CalGene

CalGene

CD + 100,000	Loan + 100,000

3. CalGene buys $100,000 worth of ACME products who banks with Wells Fargo

CalGene

CD – 100,000	

BofA

R – 100,000	CD – 100,000

rrr = 10,000
ER = 90,000

ACME

Inventory – 100,000 CD + 100,000	

Wells Fargo

R + 100,000	CD + 100,000

Fractional Reserves System: banks are not required 100% of CD in reserves. So they take out the fraction they're able to and lend it out.

4. Now suppose that Wells Fargo lends out that $90,000 Al

Wells Fargo	
Loans +90,000	CD + 90,000

Al	
CD + 90,000	Loan + 90,000

5. Now suppose Al buys $90,000 worth of steel from US Steel who banks with Citi

Al	
CD – 90,000 Steel + 90,000	

Wells Fargo	
R – 90,000	Loan + 90,000

US Steel	
CD + 90,000 Inventory -90,000	

Citi	
R + 90,000	CD + 90,000

Citi could then loan out $81,000 and the process would continue.

$$\Delta M = \Delta R + \Delta R(1 - rrr) + \Delta R(1 - rrr)^2 + \ldots =$$

$$\Delta R\left[(1 - rrr) + (1 - rrr)^2 + \ldots\right] = \Delta R \frac{1}{rrr}$$

The simple money multiplier is the inverse of the required reserve ratio.

This model is too simple -- ignores portfolio decisions

1. Public - currency choices

2. Banks - excess reserves

First - understand the factors that influence currency and reserves and then modify the multiplier.

1. Currency Holdings - measured by $\left(\frac{C}{D}\right)$

An increase in	Effect on (C/D)	Reason
Wealth	falls	less currency used in transactions
Return on deposits	falls	opportunity cost rises
Risk of deposits	rises	fear of bank runs
information	rises	desire for anonymity

2. Excess reserves - measured by $\left(\frac{ER}{D}\right)$

An increase in	Effect on (ER/D)	Reason
Market interest rates	falls	opportunity cost of *ER* rises
variability of withdrawals	rises	increased probability of illiquidity

3. Modify multiplier

Want an expression between *M* and *B*.

Start with components of the Base:

$$(1) \qquad B = C + R = C + RR + ER = \left(\frac{C}{D} + \frac{\overline{R}}{D} + \frac{ER}{D} \right) D$$

Recall that for *M1*, the money supply equals:

$$(2) \qquad M = C + D = \left(\frac{C}{D} + 1 \right) D$$

so, using eq. (1) to eliminate *D* in (2) we have:

$$(3) \qquad M = \left[\frac{1 + \frac{C}{D}}{\frac{C}{D} + \frac{\overline{R}}{D} + \frac{ER}{D}} \right] B$$

Increases in *ER* will cause the multiplier to fall. Also, increases in *C* will reduce the multiplier.

During the Depression, from March 1930 to March 1933 *B* increased by 20%. But *M1* fell by 28% => the multiplier went from 3.8 to 2.3 (a 40% fall) - why??