Lecture 5

Multiple Deposit Creation
and
the Money Supply

Chapter 15 pages 402-411 and Chapter 16 pages 412-420

Four Players in the Mˢ Process

1. Central Bank: the Fed
2. Banks
3. Depositors
4. Borrowers from Banks

Federal Reserve System

1. Conducts monetary policy
2. Clears checks
3. Regulates banks

Multiple Deposit
Creation Process

Overview of the next set of lectures

◆ Fed affects the money supply
◆ Changes in the money supply affect interest rates
◆ Interest rate changes affect the economy through aggregate demand

Basic overview of the Fed

◆ Fed has control of the monetary base
◆ monetary base=currency + bank reserves
◆ Changes in the base affect the money supply
◆ money supply (M1) = currency + checkable deposits

Questions we will answer

◆ How does the Fed change the base?
◆ How do changes in the base affect the money supply?
◆ What factors other than the Fed can affect the money supply?
◆ What is the best way for the Fed to control the base?

Questions we will answer (cont.)

◆ How can the Fed check that the desired result was achieved?

◆ How do changes in the base affect the exchange rate?

◆ Should the Fed control the base and when?

◆ How does our demand for money influence the money supply?

Money Creation Process

◆ Three main actors

◆ Federal Reserve Bank (Fed)

◆ Households

◆ Banks

◆ Each can influence the money supply

Fed Balance Sheet (simplified)

Assets	Liabilities
Government securities	Reserves
Discount loans	Currency

How does the Fed change reserves?

◆ Change government security holdings
◆ Change discount loans
◆ Change reserve requirements

5-10

Balance sheet of a commercial bank (simplified)

Assets	Liabilities
Government securities	Loans from the Fed
Loans that it issues	Checkable deposits
Reserves (vault cash and at the Fed)	

5-11

Open Market Operations

◆ Fed buys or sells government securities from banks
◆ Reserve account receives a credit or debit
◆ Example:
  ◆ Fed buys $1000 of bonds from Fleet Bank
  ◆ reserve account increases by $1000
  ◆ monetary base has increased by $1000
  ◆ what has happened to money supply?
    ◆ Nothing, so far

5-12

Discount Loans

- ◆ Fed makes a discount loan of $1000 to Fleet Bank
- ◆ Reserve account receives a credit
- ◆ by how much has the base increased?
  - ◆ $1000
- ◆ by how much has the money supply increased?
  - ◆ Nothing, so far

How does an increase in reserves create deposits?

- ◆ Fleet Bank now has $1000 in excess reserves. What should it do?
  - ◆ Lend out the funds (home equity loan, for example)
- ◆ Homeowner pays builder
- ◆ Builder deposits funds into BankBoston
  - ◆ assume none of the funds are held as cash

Deposit Creation Process (cont.)

- ◆ Assume the required reserve ratio is 10%
- ◆ BankBoston has $1000 in reserves
  - ◆ $100 are required reserves
  - ◆ $900 are excess reserves
- ◆ What should it do with the excess reserves?
  - ◆ Lend them out
- ◆ Process continues ...

Multiple Deposit Creation

Time	Increase in deposits	Increase in required reserves	Increase in excess reserves = increase in loans
0			$1000
1	$1000	$100	$900
2	$900	$90	$810
3	$810	$81	$729
4	$729	$72.90	$656.10

Formula for multiple deposit creation

◆ Δ Demand Deposits = $1/r_d$ * (Δ Reserves)

  ◆ r_d is the required reserve ratio

◆ Example:

  ◆ The Fed increases reserves by $1million

  ◆ The required reserve ratio is 5%

  ◆ By how much does the money supply change?

  ◆ Δ Demand Deposits = 1/.05 * ($1 million)

  ◆ Δ Demand Deposits = $20 million

The multiple deposit creation story

Extensions to the model

◆ What if the public wants to hold some money in the form of currency?

◆ What if the Fed changes the required reserve ratio?

◆ What if banks want to hold excess reserves?

Deposit Creation: Single Bank

First National Bank

Assets		Liabilities	
Securities	− $100		
Reserves	+ $100		

First National Bank

Assets		Liabilities	
Securities	− $100	Deposits	+ $100
Reserves	+ $100		
Loans	+ $100		

First National Bank

Assets		Liabilities	
Securities	− $100		
Loans	+ $100		

Deposit Creation: Banking System

Bank A

Assets		Liabilities	
Reserves	+ $100	Deposits	+ $100

Bank A

Assets		Liabilities	
Reserves	+ $10	Deposits	+ $100
Loans	+ $90		

Bank B

Assets		Liabilities	
Reserves	+ $90	Deposits	+ $90

Bank B

Assets		Liabilities	
Reserves	+ $ 9	Deposits	+ $90
Loans	+ $81		

Deposit Creation

TABLE 3 Creation of Deposits (assuming 10 percent reserve requirement and a $100 increase in reserves)

Bank	Increase in Deposits ($)	Increase in Loans ($)	Increase in Reserves ($)
First National	0.00	100.00	0.00
A	100.00	90.00	10.00
B	90.00	81.00	9.00
C	81.00	72.90	8.10
D	72.90	65.61	7.29
E	65.61	59.05	6.56
F	59.05	53.14	5.91
.	.	.	.
.	.	.	.
.	.	.	.
Total for all banks	1000.00	1000.00	100.00

Deposit Multiplier

If Bank A buys securities with $90 check

Bank A		
Assets		Liabilities
Reserves	+ $10	Deposits + $100
Securities	+ $90	

Seller deposits $90 at Bank B and process is same

Whether bank makes loans or buys securities, gets same deposit expansion

---

Deposit Multiplier

Simple Deposit Multiplier

$$\Delta D = \frac{1}{r_D} \times \Delta R$$

Deriving the Formula: we assume that banks hold no excess reserves, thus the total amount of required reserves for the banking system RR will equal total reserves in the banking system R:

$$R = RR = r_D \times D$$

$$D = \frac{1}{r_D} \times R$$

$$\Delta D = \frac{1}{r_D} \times \Delta R$$

Banking System As a Whole

Banking System

Assets	Liabilities
Securities– $100	Deposits + $1000
Reserves + $100	
Loans + $1000	

Critique of Simple Model

Deposit creation stops if:

1. Proceeds from loan kept in cash
2. Bank holds excess reserves

Chapter 16

Determinants
of the Money Supply

Pages 412-420

Money Multiplier

$M = m \times MB$

Deriving Money Multiplier

$R = RR + ER$

$RR = r_D \times D$

$R = (r_D \times D) + ER$

Adding C to both sides

$R + C = MB = (r_D \times D) + ER + C$

1. Tells us amount of MB needed support D, ER and C
2. An additional $1 of MB in C does not support additional D.
3. An additional $1 of MB in ER does not support D or C

$MB = r_D \times D + \{ER/D\} \times D + \{C/D\} \times D$

$= [r_D + \{ER/D\} + \{C/D\}] \times D$

Money Multiplier

$M = m \times MB$

Deriving Money Multiplier

$R = RR + ER$

$RR = r_D \times D$

$R = (r_D \times D) + ER$

Adding C to both sides

$R + C = MB = (r_D \times D) + ER + C$

1. Tells us amount of MB needed support D, ER and C
2. An additional \$1 of MB in C does not support additional D.
3. An additional \$1 of MB in ER does not support D or C

$MB = r_D \times D + \{ER/D\} \times D + \{C/D\} \times D$

$\quad\; = [r_D + \{ER/D\} + \{C/D\}] \times D$

$D = \dfrac{1}{[r_D + \{ER/D\} + \{C/D\}]} \times MB$

$M = D + \{C/D\} \times D = [1 + \{C/D\}] \times D$

$M = \dfrac{[1 + \{C/D\}]}{[r_D + \{ER/D\} + \{C/D\}]} \times MB$

$m = \dfrac{[1 + \{C/D\}]}{[r_D + \{ER/D\} + \{C/D\}]}$

$m < 1/r_d$ because no multiple expansion for currency and because as $M \uparrow ER \uparrow$

Full Model

$M = m \times [MB_n + DL]$