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Multiple Deposit Creation and the Money Supply Process

Outline

- Central Bank's Control over the Monetary Base
- Multiple Deposit Creation: A Simple Model

Four Players in the Money Supply Process

1. The Central Bank
 - The Bank of Thailand
2. Banks (Depository Institutions)
3. Depositors
4. Borrowers

Central Bank's Balance Sheet

Assets	Liabilities
Government securities Discount loans	Currency in circulation (C) Reserves (R)

Monetary Base (Liabilities of the Central Bank)

$$\text{Monetary Base (MB)} = C + R$$

Also,

$$\text{MB} = \text{Bank Notes} + \text{Coins}$$

- C is the notes and coins in nonbank public hands
- R is the notes and coins in banks' hands (may be deposited at the central bank)

Assets of the Central Bank

- Changes in the asset items lead to changes in MB, and consequently money supply
- Assets earn income to the central bank

Control of the MB (1)

Open Market Purchase from Bank

The Banking System

Assets	Liabilities
Securities – \$100	
Reserves + \$100	

Open Market Purchase from Public

Public

Assets	Liabilities
Securities – \$100	
Deposits + \$100	

Banking System

Assets	Liabilities
Reserves + \$100	Checkable Deposits + \$100

Result: $R \uparrow \$100$, $MB \uparrow \$100$

The Central Bank

Assets	Liabilities
Securities + \$100	Reserves + \$100

The Central Bank

Assets	Liabilities
Securities + \$100	Reserves + \$100

Control of the MB (2)

If public holds more cash

Public	
Assets	Liabilities
Securities – \$100	
Currency + \$100	

Result: R unchanged, $MB \uparrow \$100$

Effect on MB certain, on R uncertain

Shifts From Deposits into Currency

Public	
Assets	Liabilities
Deposits – \$100	
Currency + \$100	

The Central Bank	
Assets	Liabilities
Securities + \$100	Currency + \$100

The Central Bank	
Assets	Liabilities
	Currency + \$100
	Reserves – \$100

Banking System	
Assets	Liabilities
Reserves – \$100	Deposits – \$100

Result: $R \downarrow \$100$, MB unchanged

Control of the MB (3)

If public holds more cash

Public	
Assets	Liabilities
Securities – \$100	
Currency + \$100	

Result: R unchanged, $MB \uparrow \$100$

Effect on MB certain, on R uncertain

Shifts From Deposits into Currency

Public	
Assets	Liabilities
Deposits – \$100	
Currency + \$100	

The Central Bank	
Assets	Liabilities
Securities + \$100	Currency + \$100

The Central Bank	
Assets	Liabilities
	Currency + \$100
	Reserves – \$100

Banking System	
Assets	Liabilities
Reserves – \$100	Deposits – \$100

Result: $R \downarrow \$100$, MB unchanged

Control of the MB (4)

If central bank provides more discount loans

Banking System The Central Bank

Assets		Liabilities		Assets		Liabilities	
Reserves		Discount		Discount		Reserves	
+ \$100		loan + \$100		loan + \$100		+ \$100	

Result: $R \uparrow \$100$, $MB \uparrow \$100$

Conclusion: CB has better ability to control MB than R

Deposit Creation (1)

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 (2)

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 (3)

Table 1 Creation of Deposits (assuming 10% 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	1,000.00	1,000.00	100.00

Deposit Creation (4)

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, get same deposit expansion

Money Multiplier

- Banks and public decisions to hold cash affect the amount of money supply (M)
- We will develop a money supply model that take into accounts these decisions
- ***Money multiplier*** is a ratio that relates the change in M to a given change in MB

The Money Supply Model (1)

- $M = m \cdot MB$ (1)

- Assume that:

- $C = c \cdot D$ (2)

- $ER = e \cdot D$ (3)

where C = the currency in circulation

ER = excess reserve

D = checkable deposits

The Money Supply Model (2)

- $R = RR + ER$ (4)

where R = total reserves

RR = required reserves

- $RR = r \cdot D$ (5)

where r = required reserve ratio

The Money Supply Model (3)

- $MB = R + C$ (6)

- From (4) and (6),

$$MB = RR + ER + C \quad (7)$$

- Recall that an increase in MB that goes into C is not multiplied
- It is worse if MB goes into ER

The Money Supply Model (4)

- From (2), (3), (5), and (7),

$$MB = r \cdot D + e \cdot D + c \cdot D \quad (8)$$

- Thus, we have

$$D = MB / (r + e + c) \quad (9)$$

The Money Supply Model (5)

- Money supply here is M1
- Hence,

$$M = D + C \quad (10)$$

- From (2) and (10),

$$\begin{aligned} M &= D + c \cdot D \\ &= (1 + c) \cdot D \end{aligned} \quad (11)$$

The Money Supply Model (6)

- From (9) and (11),

$$M = [(1+c)/(r+e+c)] \cdot MB \quad (12)$$

- Equation (12) implies that:

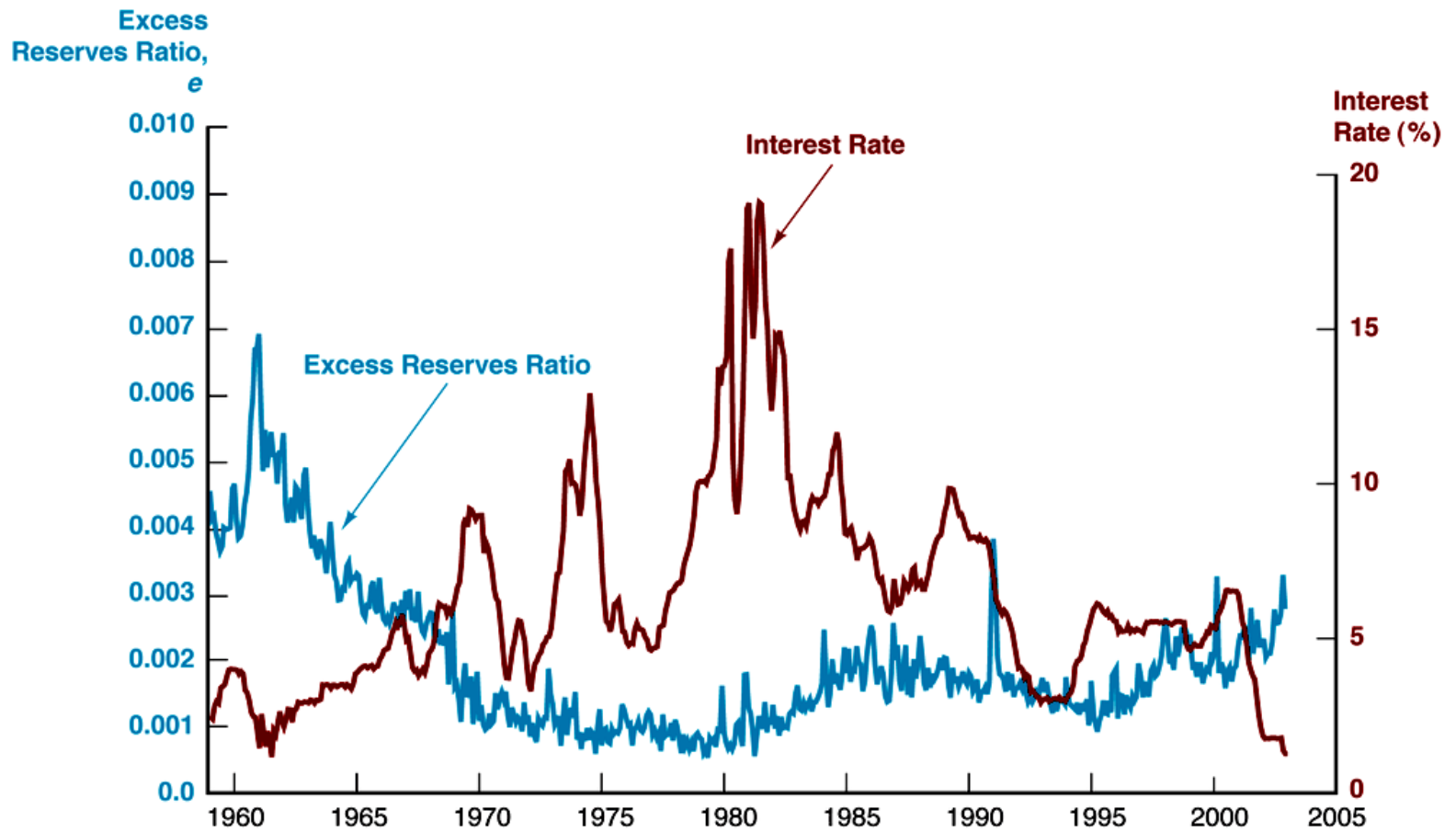
$$m = [(1+c)/(r+e+c)] \quad (13)$$

Factors Determining m

- From (13), $m = [(1+c)/(r+e+c)]$
- m has
 - negative relationship to r
 - negative relationship to c
 - negative relationship to e

2 Factors Affecting e

- Why banks hold more excess reserves, or increase e ?
 - Market interest rate → Negative relationship
 - Expected deposit outflows → Positive relationship



Full Model (1)

- We can also define

$$MB = MB_n + DL \quad (14)$$

where MB_n = non-borrowed MB

DL = discount loans

- Thus, we have

$$M = [(1+c)/(r+e+c)] \cdot (MB_n + DL) \quad (15)$$

Full Model (2)

- Central Bank can control *non-borrowed MB*, through open market operations
- However, CB can *not* control the amount of *discount loans*

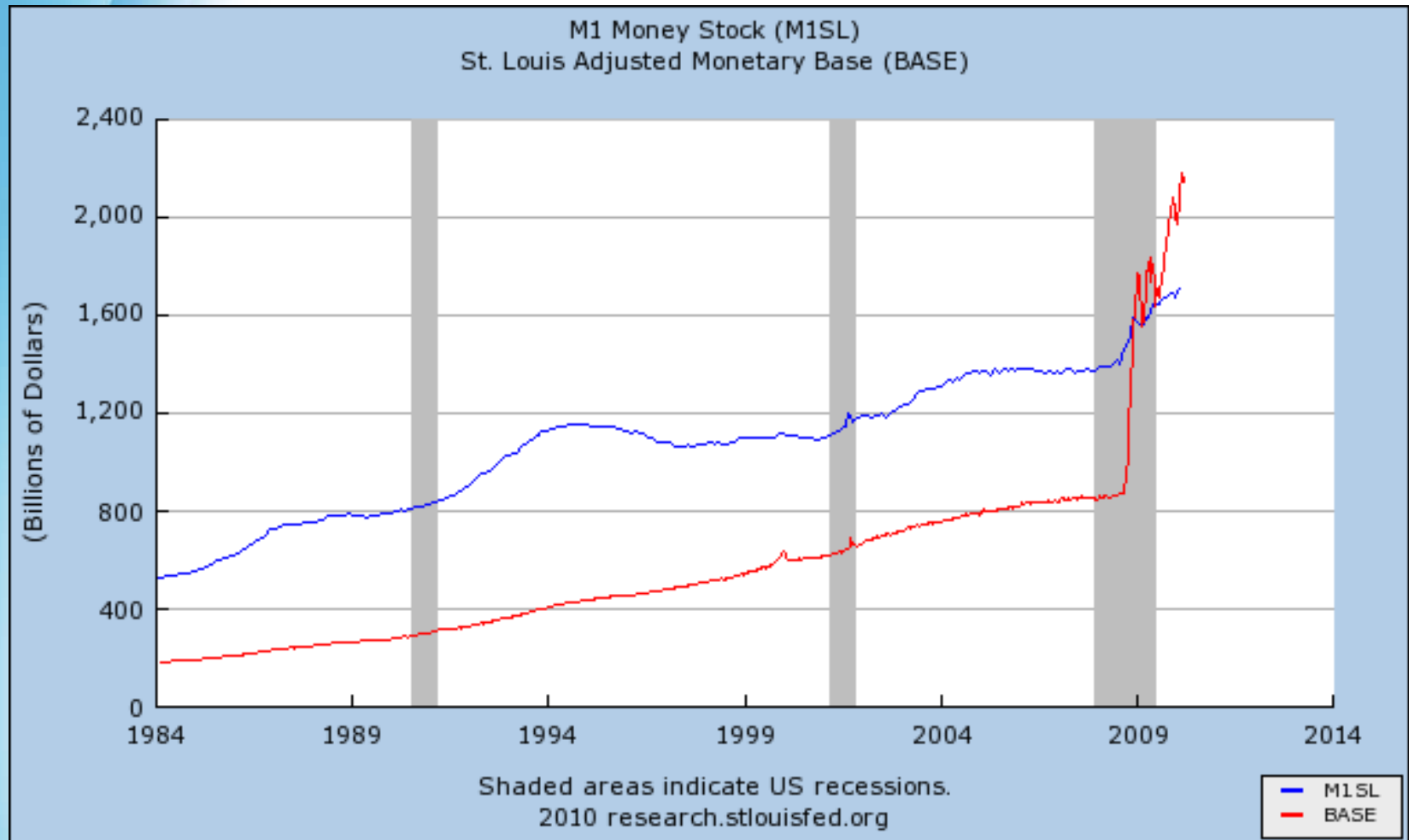
Full Model (3)

SUMMARY Table 1 Money Supply (M1) Response

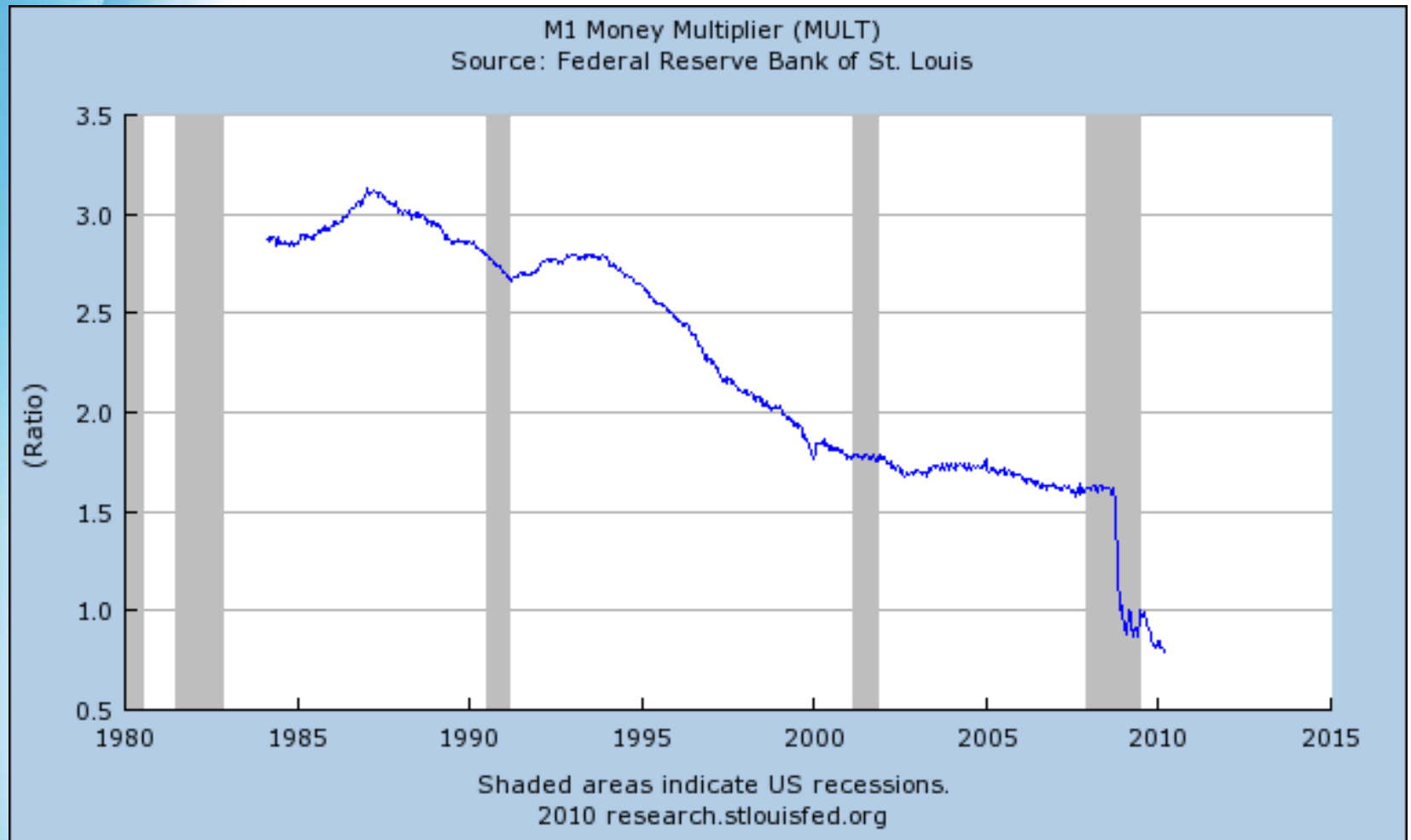
Player	Variable	Change in Variable	Money Supply Response	Reason
Federal Reserve System	r	↑	↓	Less multiple deposit expansion
	MB_n	↑	↑	More MB to support D and C
	DL	↑	↑	More MB to support D and C
Depositors	c	↑	↓	Less multiple deposit expansion
Depositors and banks	Expected deposit outflows	↑	↓	e ↑ so fewer reserves to support D
Borrowers from banks and the other three players	i	↑	↑	e ↓ so more reserves to support D

Note: Only increases (↑) in the variables are shown. The effects of decreases on the money supply would be the opposite of those indicated in the “Money Supply Response” column.

An Interesting Fact (1)



An Interesting Fact (2)



An Interesting Fact (3)

- Can m be less than one?
- Yes!
- $m = [(1+c)/(r+e+c)]$
- What'd happen during that time?

Some Interesting Questions (1)

- During the Subprime Crisis, the currency ratio c rose dramatically. What do you think happened to the money supply?
- The central bank buys 100 billion baht of bonds from the public and also lowers r . What will happen to the money supply?

Some Interesting Questions (2)

- The Fed has been discussing the possibility of paying interest on excess reserves. If this occurred, what would happen to the money supply?