

# Lecture 1: The Money Supply Process

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## 1. Overview

- **Functions of Money**
- **Money Supply**
- **Money Demand**
- **Money Market Equilibrium**

## Functions of money

- Medium of exchange
- Unit of account
- Store of value

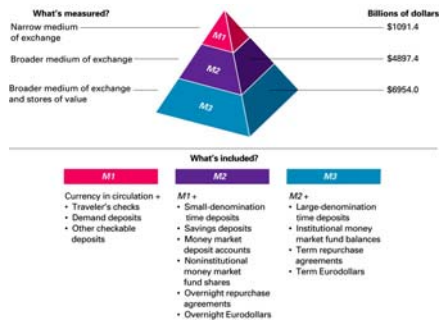
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## Supply of Money

- Narrow definition: M1
- M2
- M3
- M1 is used in the text; M2 is watched closely by the Fed

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**Figure 2.2**  
**Measuring Monetary Aggregates**



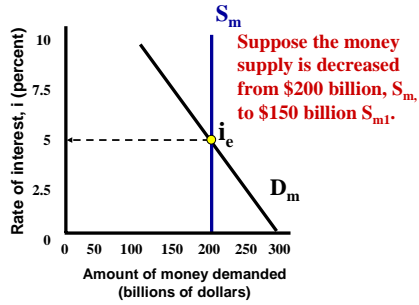
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## Demand for money

- Transactions demand
- Asset demand
- Total demand

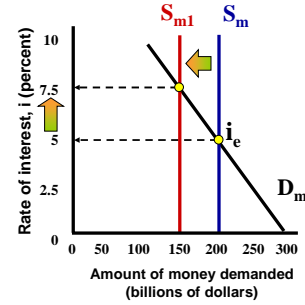
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## THE MONEY MARKET



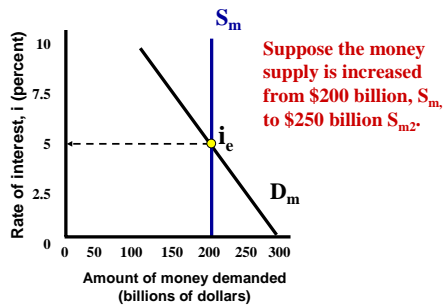
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## THE MONEY MARKET



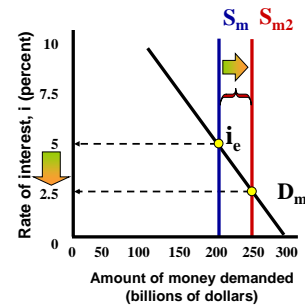
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## THE MONEY MARKET



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## THE MONEY MARKET



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## 2. Money Multiplier

- Money supply process
- Balance sheet
- Money creation by a single bank
- Multiple-deposit expansion by the entire banking system
- Reading: Chapter 13, 17

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## The Money Supply Process



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## Balance Sheet

- listing assets, liabilities, and net worth.
  - Bank liabilities: sources of the acquired funds.
  - Bank net worth is the bank's equity capital.
  - Bank assets: uses of the acquired funds.

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### Table 13.1 Balance Sheet of U.S. Commercial Banks, 2000

**BALANCE SHEET OF U.S. COMMERCIAL BANKS, 2000\***

Assets (uses of funds)		Liabilities (sources of funds) and net worth	
Reserves		Checkable deposits	11.3%
Cash items in process of collection	} 4.2%	Nontransaction deposits	42.1
Deposits at other banks		Savings deposits and time deposits (CDs)	10.2
Securities	20.9	Large, negotiable time deposits (CDs)	18.9
U.S. government and agency	13.6	Borrowings (from the Federal Reserve, in the federal funds market, from subsidiaries and affiliates, and through repurchase agreements)	9.6
State and local government and other securities	7.3	Equity capital (net worth)	7.9
Loans	68.2		
Commercial and industrial	16.4		
Mortgage	30.0		
Consumer	10.0		
Interbank	4.0		
Other loans	8.0		
Miscellaneous assets	6.7		

\* Figures are expressed as a percentage of total assets for all domestically chartered commercial banking institutions in the United States as of September 2000.  
Source: Federal Reserve Bulletin, December 2000, Table 1.26.

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### BOA

ASSETS	LIABILITIES AND NET WORTH
Reserves Loans	Checkable Deposits

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### Transaction 1: BOA accepts deposits \$100,000

ASSETS	LIABILITIES AND NET WORTH
Reserves     \$	Checkable Deposits     \$

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### Transaction 1: BOA accepts deposits \$100,000

ASSETS	LIABILITIES AND NET WORTH
Reserves <b>\$100,000</b>	Checkable Deposits <b>\$100,000</b>

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### Transaction 2: a check of \$50,000 is drawn

ASSETS	LIABILITIES AND NET WORTH
Reserves     \$	Checkable Deposits     \$

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**Transaction 2: a check of \$50,000 is drawn**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$ 50,000	Checkable Deposits	\$50,000

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## A Simple Money Creation Model

**Assumptions:**

- Recipients of funds always deposit them rather than cash them
- Banks will keep no excess reserves
- Required reserve ratio is 20%

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**BOA accepts deposits \$100,000**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$100,000	Checkable Deposits	\$100,000

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**BOA loans out its excess reserve**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$100,000	Checkable Deposits	\$100,000
Loans	+80,000		+ 80,000

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**Loan is used by the borrower to make payments**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$100,000	Checkable Deposits	\$100,000
	-80,000		+80,000
Loans	+ 80,000		-80,000

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**BOA's balance sheet**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$20,000	Checkable Deposits	\$100,000
Loans	80,000		

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**Wells Fargo receives a check of \$80,000**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$ 16,000	Checkable Deposits	\$80,000
Loans	64,000		

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**HSBC receives a check of \$64,000**

ASSETS		LIABILITIES AND NET WORTH	
Reserves	\$ 12,800	Checkable Deposits	\$64,000
Loans	51,200		

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**MULTIPLE DEPOSIT EXPANSION PROCESS**

Bank	Acquired reserves and deposits	Required reserves	Excess reserves	Amount bank can lend - New money created
A	\$100.00	\$20.00	\$80.00	\$80.00
B	80.00	16.00	64.00	64.00
C	64.00	12.80	51.20	51.20
D	51.20	10.24	40.96	40.96
E	40.96	8.19	32.77	32.77
F	32.77	6.55	26.21	26.21
G	26.21	5.24	20.97	20.97
H	20.97	4.20	16.78	16.78
I	16.78	3.36	13.42	13.42
J	13.42	2.68	10.74	10.74
K	10.74	2.15	8.59	8.59
L	8.59	1.72	6.87	6.87
M	6.87	1.37	5.50	5.50
N	5.50	1.10	4.40	4.40
Other banks	21.99	4.40	17.59	17.59
<b>Total amount of money created by the banking system</b>				<b>\$400.00</b>

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**THE MONETARY MULTIPLIER**

$$\text{Monetary Multiplier} = \frac{1}{\text{Required reserve ratio}}$$

$$\text{Maximum checkable-deposit creation} = \text{Excess reserves} \times \text{Monetary Multiplier}$$

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- Assumptions of this Simple Model**
1. Banks will keep no excess reserves
  2. Recipients of funds always deposit them rather than cash them
  3. Ignores, in other words, the actions of borrowers, depositors, and banks
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**Example 1**

- If reserve requirement is 10% and excess reserves increase \$100, how much will deposits increase?

$$\Delta D = 1/.10 * 100 = 10 * 100 = 1000$$

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## Example 2

- If reserve requirement is 10% and excess reserves decrease \$100, what will happen to deposits?
- Multiple deposit contraction:  
 $\Delta D = 1/.10 * (-100) = 10*(-100) = -1000$

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## More Complex Money Multiplier

- **Money Multiplier**

Def.  $MS = m \times MB$

- **Deriving Money Multiplier**

$$R = RR + ER$$

$$RR = r_D \times D$$

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

- **Money Supply**

$$MS = C + D$$

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## Money Multiplier Derivation

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

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

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## Money Multiplier Example

$$r_D = .2; C = 100; D = 200; ER = 10$$

$$m = \frac{1 + \{100/200\}}{.2 + \{10/200\} + \{100/200\}}$$

$$.2 + \{10/200\} + \{100/200\}$$

$$m = 1.5 / (.2 + .05 + .5)$$

$$m = 1.5 / .75 = 2$$

That means a \$1 increase in MB will lead to a \$2 increase in M1.

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## Summary

- The money supply (MS) equals the money multiplier (m) times the monetary base (MB).
- The money multiplier (m) depends on the required reserve ratio,  $ER/D$ , and  $C/D$ .

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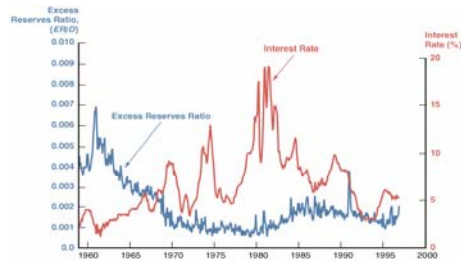
## What Affects C/D?

### DETERMINANTS OF THE CURRENCY-DEPOSIT RATIO

An increase in ...	Causes C/D to ...	Because ...
wealth	fall	in general, $C/D$ decreases with rising income and wealth in the economy.
expected returns on deposits	fall	an increase in interest rates offered on checkable deposits increases the public's demand for those deposits relative to currency and decreases $C/D$ .
riskiness of deposits	rise	under normal circumstances, default risk does not affect $C/D$ . During banking panics, an increase in the perceived riskiness of deposits increases $C/D$ .
liquidity of deposits	no change	under normal circumstances, there is little difference in the liquidity of currency and checkable deposits and thus little or no effect on $C/D$ .
information or anonymity value of cash	rise	an increase in the demand for anonymity, owing to black-market, tax evasion, other illegal activities, or desirability abroad increases $C/D$ .

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### What Affects ER/D?



Determinants of  $\{ER/D\}$   
 $i \uparrow$ , Relative  $RET$  on  $ER \downarrow$  (opportunity cost  $\uparrow$ ),  $\{ER/D\} \downarrow$

### Bank Behavior: Excess Reserves and Discount Loans

- Banks sometimes hold excess reserves, reducing the size of the money multiplier ( $m$ ).
- Banks' decisions to incur discount loans affect the size of the monetary base ( $MB = \text{nonborrowed } MB + \text{discount loans}$ ).

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Table 17.3 Determinants of Excess Reserves and Discount Loans

**DETERMINANTS OF EXCESS RESERVES AND DISCOUNT LOANS**

An increase in ...	Causes ...	Because ...
market interest rates	excess reserves to fall	the opportunity cost of holding excess reserves rises.
average level or variability of deposit outflows	excess reserves to rise	banks require a greater cushion against outflows.
market interest rates relative to the discount rate	discount loans to rise	banks' profits from discount borrowing increase.

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Table 17.4 Variables in the Money Supply Process

**VARIABLES IN THE MONEY SUPPLY PROCESS**

An increase in the ...	Based on the actions of ...	Causes the money supply to ...	Because ...
nonborrowed base, $B_n$	the Fed (open market operations)	rise	the monetary base rises, and more reserves are available for deposit expansion.
reserve requirements, $R/D$	the Fed (reserve requirements)	fall	fewer reserves can be lent out, and the money multiplier falls.
discount rate	the Fed (discount policy)	fall	discount loans become more expensive, reducing borrowed reserves and the monetary base.
currency-deposit ratio, $C/D$	the nonbank public (portfolio decisions)	fall	the money multiplier falls, reducing deposit expansion.
excess reserves relative to deposits, $ER/D$	banks (portfolio decisions)	fall	the money multiplier falls, reducing deposit expansion.
expected deposit outflows	the nonbank public (transactions considerations)	fall	excess reserves rise relative to deposits, reducing the money multiplier and deposit expansion.
variability of deposit outflows	the nonbank public (transactions and portfolio considerations)	fall	excess reserves rise relative to deposits, reducing the money multiplier and deposit expansion.

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### Conclusion

- Over the long term, movements in  $M1$  is best explained by movements in  $MB_n$  (nonborrowed monetary base)
- in the short run, changes in  $m$  (the money multiplier) are most important
- those changes in  $m$  are mostly caused by changes in  $\{C/D\}$  (the currency deposit ratio)
- as  $\{C/D\}$  moves down,  $m$  moves up

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