Money Supply Process

Economics 301: Money and Banking

Goals and Learning Outcomes

- Goals:
  - Understand balance sheets of Federal Reserve system and banking system.
  - Understand how money is created and multiplied.
  - Understand determinants of money supply.
- Learning Outcomes:
  - LO4: Explain the structure of the Federal Reserve System and the mechanisms in which it controls the money supply.

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Reading

- Read Mishkin, Chapter 13.

Federal Reserve Balance Sheet

Federal Reserve System

Assets	Liabilities
Government securities	Currency in circulation
Discount loans	Reserves
Corporate securities	
Mortgage backed securities	

- Assets: securities purchased by the Federal Reserve.
- Fed began buying corporate and mortgage backed securities in response to latest financial crisis.
- Reserves:
  - Banks have accounts at the Fed in which they hold deposits to be used to meet their own depositors needs.
  - Reserves = Deposits of banks at Fed + currency physically held by banks in vaults.

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Banking System Balance Sheet

Banking System

Assets	Liabilities
Government securities	Checkable deposits
Personal/Corporate Loans	Other types of deposits
Loaned federal funds	Borrowed federal funds
Reserves	Discount Loans
Physical Collateral on Defaults	

Open Market Operations

- Monetary base = currency in circulation + total reserves in banking system (MB=C+R).
- Open market purchase of $100 in Treasury Bills from Banking system.

Banking System

Assets		Liabilities	
Government Securities	-$100		
Reserves	+$100		

Federal Reserve System

Assets		Liabilities	
Government Securities	+$100	Reserves	+$100

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Federal Reserve System

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

Open Market Purchase from Public

- Open market purchase of $100 from non-bank public.
- Suppose public deposits $80 of proceeds in banks and holds $20 currency.

Non-bank Public

Assets		Liabilities
Government Securities	-$100	
Checkable Deposits	+$80	
Currency	+$20	

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Open Market Purchase from Public (continued)

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Banking System

Assets		Liabilities	
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Federal Reserve System

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Discount Loan

- **Discount loan:** loan in which a bank or financial institution borrows funds directly from the Federal Reserve.
- Suppose Acme Bank makes a $200 discount loan.

Banking System

Assets		Liabilities	
Reserves	+\$200	Discount Loans	+\$200

Federal Reserve System

Assets		Liabilities	
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Deposit Creation

- Suppose **required reserve ratio** is 5% and banks hold no excess reserves.
- Suppose Fed makes a \$100 open market purchase of bonds.
- Increases banks' reserves by \$100, they in turn loan full amount to non-bank public.
- Non-bank public borrows \$100 and spends it.
- \$100 expenditure becomes \$100 income for others in non-bank public.
- Suppose non-bank public holds zero currency, puts full amount in checkable deposits.

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Deposit Creation (continued)

- Banks deposits increase by \$100.
- Put puts $(0.05)(\$100) = \$5$ in reserves (minimum required), loans out remaining \$95.
- Non-bank public borrows \$95, this becomes income for others, which ends up in deposits.
- Banks put $(0.05)(\$95) = \$4.75$ in reserves, loans out remaining \$90.25.
- Non-bank public borrows \$90.25, this becomes income for others, which ends up in deposits again.
- Banks put $(0.05)(\$90.25) = \$4.51$ in reserves, loans out remaining \$85.74...

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Money Multiplier

- A single \$100 open market purchase of bonds created an increase of deposits equal to...

$$\Delta D = \$100 + 95 + 90.25 + 85.74 + \ldots$$

- Let ΔR denote initial change in reserves (\$100), r denote required reserve ratio.

$$\Delta D = \Delta R + (1-r)\Delta R + (1-r)^2\Delta R + (1-r)^3\Delta R + \ldots$$

- Can you simply this expression? How much larger is change in deposits compared to open market purchase?

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Money Multiplier Algebra

- Required reserves = (required reserve ratio)(deposits).
- Recall, we assume Actual reserves = Required Reserves.

$$R = rD$$

$$D = \frac{1}{r}R$$

$$\Delta D = \frac{1}{r}\Delta R$$

- Money multiplier $= m = \frac{1}{r}$.
- Money Supply = (money multiplier) (monetary base).

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General Money Multiplier

- Suppose people do hold currency, banks hold excess reserves.
- Notation:
  - C: Currency holdings.
  - D: Deposits.
  - RR: Required reserves.
  - ER: Excess reserves.
  - R: Actual reserves.
  - MB: Monetary base.
- For simplicity, assume ratios of currency holdings and excess reserves are constant:
  - $c = C/D$ = currency ratio.
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- Use $MB = R + C$ and $M1 = C + D$ to derive money multiplier.

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Determinants of Money Supply

- Monetary base is composed of,
  - Non-borrowed monetary base: reserves and currency that were not borrowed directly from Federal Reserve.
  - Borrowed reserves: reserves that were directly borrowed from Federal Reserve.
- Factors affecting money supply:
  - Open market operations (affect non-borrowed monetary base).
  - Changes in required reserve ratio.
  - Changes in banks desire to hold excess reserves.
  - Changes in consumers' desire to hold currency versus deposits.
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Endogenous Money Supply

- Typical assumption: central bank exogenously influences money supply through open market operations.
- How might excess reserves be influenced by interest rate?
- For a given discount rate, how might borrowed reserves be influenced by interest rate?

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Coming up...

- In-class exercise.
- Monetary Policy Tools (Chapter 14)