Overview of Part B

- Part B: Money and the Macroeconomy
- Money Supply and Money Demand
  - Money supply
    - The central bank and the *Money supply process*
  - Money demand
    - The households and the *Money demand function*
- Macroeconomic Models
  - Macroeconomic models with money
    - The IS-LM model
    - The AD-AS model
    - New classical and New Keynesian models
  - Monetary policies and related debates

The Money Supply Process

- Money supply
  - Affects interest rates
  - Economic activities
  - Overall health of the economy
- Questions about money supply
  - Who controls money supply?
  - What causes it to change?
The Players

- The Central Bank
  - For the U.S.: The Federal Reserve System ('Fed')
- Banks (depository institutions)
  - Commercial banks, savings and loan associations, mutual savings banks, credit unions
- Depositors
  - Households and institutions
- Borrowers
  - Firms and institutions

Fed’s Balance Sheet

<table>
<thead>
<tr>
<th>Federal Reserve System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>Government securities</td>
</tr>
<tr>
<td>Discount loans</td>
</tr>
</tbody>
</table>
Fed’s Monetary Liabilities

- Currency in circulation—in the hands of the public
  - Fed’s notes are recognized medium of exchange
- Reserves—bank deposits at the Fed and vault cash
  - Required reserves
    - Deposits and withdrawals: Law of large numbers (LLN)
    - Required reserve ratio \( r \), 10%
  - Excess reserves
  - Currency held by the depository institutions is counted as part of the reserve
- ↑ in reserves → ↑ in the money supply

Fed’s Assets

- Government securities
  - Feds holdings of securities issued by the U.S. Treasury
  - Fed provides reserves to the banking system by purchasing securities
  - ↑ in government securities held by the Fed → ↑ in the money supply
- Discount loans—provide reserves to banks and earn the discount rate
  - “Borrowing from the Fed” or “Borrowing reserves”
  - Discount rate: the interest rate on these borrowings
  - Fed can control these borrowings by controlling the discount rate
Monetary Base

Monetary Base (a.k.a. High-powered money):

\[ MB = C + R \]

- **Currency in circulation**
  - Federal reserve currency (Federal Reserve Notes)
  - Treasury currency (primarily coins), less than 10% of the base
- **Monetary Policy involves (primarily) controlling the base**

Controlling the Base

- **Open market operation (OMO)**
  - Purchase (or sale) of bonds by the Fed
  - Primary way to change monetary base
- **Discount loans**
  - Making discount loans to banks
  - Change the discount rate
- **Other factors**
  - There are some other factors that are not fully controlled by the Fed that may also change the base
  - The Fed can usually calculate their fluctuations
Deposit Creation

- OMO: Suppose, $100 bond purchased by Fed from First National Bank (FNB)
- FNB has an increase in reserve by $100
- $r = 10\%$
- FNB’s actions
  - Keep $10 in Fed’s reserve
  - Loan out $90 to Bob
- Bob’s bank is Bank A
- Process continues …

**TABLE 1**  
*Creation of Deposits (assuming 10% reserve requirement and a $100 increase in reserves)*

<table>
<thead>
<tr>
<th>Bank</th>
<th>Increase in Deposits ($)</th>
<th>Increase in Loans ($)</th>
<th>Increase in Reserves ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First National</td>
<td>0.00</td>
<td>100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>A</td>
<td>100.00</td>
<td>90.00</td>
<td>10.00</td>
</tr>
<tr>
<td>B</td>
<td>90.00</td>
<td>81.00</td>
<td>9.00</td>
</tr>
<tr>
<td>C</td>
<td>81.00</td>
<td>72.90</td>
<td>8.10</td>
</tr>
<tr>
<td>D</td>
<td>72.90</td>
<td>65.61</td>
<td>7.29</td>
</tr>
<tr>
<td>E</td>
<td>65.61</td>
<td>59.05</td>
<td>6.56</td>
</tr>
<tr>
<td>F</td>
<td>59.05</td>
<td>53.14</td>
<td>5.91</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Total for all banks</td>
<td>1,000.00</td>
<td>1,000.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Formula for Multiple Deposit Creation

\[ RR = \text{required reserve} \]
\[ R = \text{total reserve} \]
\[ r = \text{reserve ratio} \]
\[ D = \text{total amount of checkable deposits} \]

Note that, \( \Delta \) denotes change.

Assumption: Banks do not hold to any excess reserves

\[ \Rightarrow \text{total reserve is just the required reserve} \]

\[ \therefore RR = R \]
\[ r \times D = R \]
\[ D = \frac{1}{r} \times R \]
\[ \Delta D = \frac{1}{r} \times \Delta R \]

[Example: \( r = 0.10, \Delta R = 100, \Delta D = 1000 \)]