**Liquidity**

- When the rate of return of other assets exceeds that of fiat money, fiat money is not valued in our model economies.

- In real economies, people still want to hold fiat money even though alternative assets seem to offer greater rates of return. Why?

- From the last chapter we found one possible way to answer this question. People want to hold money because it is less risky than other assets.

- In this chapter we consider the additional possibility is that fiat money is more liquid than alternative assets.

- An asset is liquid if it is exchanged easily, quickly, and at little cost.

- Money is less costly to exchange than other assets.
A Model of Illiquidity

- We expand our simple economy model with the following assumptions:

  o Fiat money and capital are both valued.

  o The rate of return of capital exceeds that of fiat money.

  o Fiat money is more liquid than capital.

  o Consider the overlapping generations model in which people live for three periods; young in the first period, middle-aged in the second period, and old in the third period.

  o \( N_t = nN_{t-1} \), and supply of fiat money is constant.

  o People are endowed with \( y \) units of consumption good when young and nothing in the other two periods of life.
o A unit of capital $k$ is created from a unit of consumption good in the first period and produces $X$ units of the consumption good two periods after. The depreciation rate is 100 percent. Let $X > n^2$.

o Two assumptions about information:

  ▪ It is impossible for anyone to observe the capital created by others, so nobody can trade the capital in the second period of life.

  ▪ It is impossible (for now) to enforce the repayment of IOUs, so nobody is willing to lend.

o People provide their second-period consumption by holding fiat money. They sell some of their endowment for money when young and use it to buy consumption good when middle-aged.

o Capital created in the first period produces people’s third-period consumption.
People will not use fiat money for third-period consumption because return on capital is higher.

To prove the above statement is true, let us compare the rate of return on fiat money and capital.

- Two-period rate of return on fiat money is
  
  \[ \frac{V_{t+2}}{V_t} = \frac{V_{t+2}}{V_{t+1}} \frac{V_{t+1}}{V_t} = nn = n^2. \]

- The rate of return on capital is \( X \).

- By our assumption \( X > n^2 \), people will choose to provide third-period consumption by holding capital.

- To summarize these assumptions, let us write down individual’s budget constraint.
• The budget constraint in the first period of life:

\[ c_{1,t} + \nu_t m_t + k_t \leq y. \]

• The budget constraint in the second period of life:

\[ c_{2,t+1} \leq \nu_{t+1} m_t. \]

• The budget constraint in the third period of life:

\[ c_{3,t+2} \leq X k_t. \]

• The lifetime budget constraint:

\[ c_{1,t} + \left[ \frac{\nu_t}{\nu_{t+1}} \right] c_{2,t+1} + \left[ \frac{1}{X} \right] c_{3,t+2} \leq y. \]
• We have learnt from last chapter that people hold various types of assets simultaneously when their rates of return are equal. However, it is not true in this case.

  o The one-period rate of return on fiat money exceeds that of capital because capital yields zero return if held only one period.

  o The two-period rate of return on capital exceeds that of fiat money.

• Why is rate-of-return equality violated?

• It is because these two assets are not substitutes. Capital is illiquid, so people cannot trade capital in their second period of life.

• However, people will hold an asset that yields higher return in each period.
The Business of Banking

• We are now relaxing the assumption of lacking information about borrowers.

• Assume that people cannot hide from their creditors, so the enforcement of their IOUs is possible. Someone is willing to lend money to others. IOUs is called “inside money”- money issued by private intermediaries.

• Since the rates of return on long- and short-term assets are different, some people can make profits through rate-of-return differences. We call this action “arbitrage”.

• How can they make such profits?

• Suppose you are the only issuer of IOUs. You borrow one unit of consumption good in period $t$ from a young person (A) at that time and invest it in capital. You have to pay A at least $n$ in period $t+1$ for her to be willing to lend you a loan.
• In period $t+1$, you have no payoff from capital yet. You borrow $n$ units of consumption good from another young person (B) who born in period $t+1$ in order to pay A. You have to pay at least $n^2$ goods in period $t+2$ for B to be willing to lend you loans.

• In period $t+2$, you receive payoff $X$ from your investment in capital. You owe B for a total of $n^2$ goods. Therefore, you can make a profit of $X - n^2 > 0$.

• This is how banking business works. Financial intermediation or arbitrage is the job of banking.

• The opportunity to make arbitrage profits induced the intermediary to correct the mismatch of liquid and illiquid assets.

• What happens if a large number of people can issue IOUs? What will be the one-period rate of return ($r^*$) on IOUs in a competitive equilibrium?

• Intermediaries will compete by offering higher rates of return on IOUs until zero profits are displayed.
Example 1 (page 144)

Suppose two-period rate of return on capital ($X$) is 1.21 and population growth rate ($n$) is 1.05. The Intermediary agrees to pay a one-period rate of return ($r$) of 1.05 on deposits, and accepts deposits of 100 units of consumption good at time $t$.

a. Find the arbitrage profit.

b. What is $r^*$ in a competitive equilibrium?
Example 2

Consider an economy in which people live two-period lives in overlapping generations but are endowed only in the first period of life. Capital has a minimum size, $k^*$, which is greater than the endowment of any single individual but less than the total endowment of a single generation. Capital pays a one-period gross real rate of return equal to $x$. The population grows 10 percent in each period. There exists a constant nominal stock of fiat money owned by the initial old.

a. In what sense is capital illiquid in this economy? Is fiat money subject to this same liquidity problem?

b. Describe an intermediary that might overcome the illiquidity of capital so that intermediated capital may be used to acquire consumption in the second period of life.

c. Suppose there is only one person in each generation who is able to run an intermediary. What is the minimum rate of return that person must offer in order to attract depositors? For what values of $x$ can this individual make a profit?

d. What rate of return will be offered on deposits if there are many people in each generation able to run an intermediary?