• We assumed earlier that money and other assets are perfect substitutes. However, capital and other assets yield the higher returns than money in reality.

• Suppose that the rate of return on capital and other assets exceed that of fiat money.

• We are interested in observing the consequence of anticipated inflation under this new circumstance.

• Assume that each young person is required by law to acquire real balances of money worth a fixed number of goods, $q^*$, to ensure that fiat money is valued.

• What will be the effect of anticipated inflation when money and other asserts are not substitutes?
Interest Rates

• The nominal interest rate, $R_t$, is the number of dollars paid in interest for each dollar lent or the rate of return in units of money. It is the “interest rate” that we are familiar in the real world.

• The real interest rate, $r_t$, is the number of goods paid in interest for each good lent or the rate of return in units of goods.

• In time of inflation, nominal rates do not reflect the real rates of return.

• For a loan of $d$ dollars:

\[ r_t = \frac{R_t d}{d} = \frac{R_t p_t}{p_{t+1}}, \]

\[ R_t = r_t \left( \frac{p_{t+1}}{p_t} \right), \]

\[ R_t - 1 = (r_t - 1) + \left( \frac{p_{t+1}}{p_t} - 1 \right) + \left( r_t - 1 \right) \left( \frac{p_{t+1}}{p_t} - 1 \right). \]
• Recall from previous chapters;

\[
\frac{p_{t+1}}{p_t} = \frac{v_t}{\nu_{t+1}} = \frac{z}{n},
\]

\[
R_t = r_t \left( \frac{z}{n} \right).
\]

**Example 6.2**

Suppose that \( M_t = 1.5M_{t-1} \) and \( N_t = 1.25N_{t-1} \). Let the gross real interest rate be 1.1.

a. Calculate the gross and net inflation rates.

b. Calculate the gross and net real rates of return of fiat money.

c. Calculate the gross and net nominal interest rates.

d. Calculate the net nominal interest rate using the approximation

\[
R - 1 = (r - 1) + \left( \frac{p_{t+1}}{p_t} - 1 \right).
\]
Anticipated Inflation and the Nominal Interest Rate

- Assume the rate-of-return equality, and let $x$ be the rate of return on capital. The real interest rate must be equal to the real rate of return on capital.

$$x = r = R \left( \frac{n}{z} \right),$$

$$R = x \left( \frac{z}{n} \right).$$

- To keep the real interest rate constant at $x$, the nominal interest rate must rise according to the anticipated inflation.

- The full adjustment of the nominal interest rate to the anticipated inflation is called the Fisher effect.
Anticipated Inflation and the Real Interest Rate

• Can inflation affect the real interest rate?

• It is possible in the following way.

• Suppose that fiat money and capital are substitutes, and capital exhibits diminishing marginal product.

• An increase in the anticipated inflation rate encourages people to save more in form of capital.

• An increase in capital stock reduces the real rate of return on capital.

• Since we assume the rate-of-return equality, the real rate of interest will also decrease.

• Therefore, the nominal interest rate will not fully rise with the anticipated inflation due to the reduction in the real rate of interest.
Risk

- What would happen to rate-of-return equality if there is uncertainty in the rate of return on assets?

- People who do not care about risk are risk neutral.

- They would expect rate-of-return equality to hold on average.

- **The expected rate of return** can be calculated as the sum of each rate of return multiplied by the probability it will occur.

- Suppose an asset yield the returns $r_n$ with the probabilities $\pi_n$. The expected rate of return, $E(r)$ is

  $$E(r) = \pi_1 r_1 + \pi_2 r_2 + \ldots + \pi_n r_n.$$ 

- People who dislike risk are risk averse. However, it does not mean that they will not accept a risky asset.
• They will hold the risky asset only if the expected rate of return exceeds that of the risk-free asset.

• The compensation for the risk is called a risk premium.

\[
\text{risk premium} = E(r_{\text{risky}}) - r_{\text{safe}}.
\]

**Example**

Suppose capital is risky and pays gross real rates of return of 1.2, 1.1, and 0.9 with probabilities 0.1, 0.7, and 0.2, respectively. A risk-free asset pays a safe gross real rate of return of 1.04. What is the expected rate of return on capital? What is the risk premium of capital?