国际经济学

短期汇率决定理论：一种资产方法

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提纲

Motivation

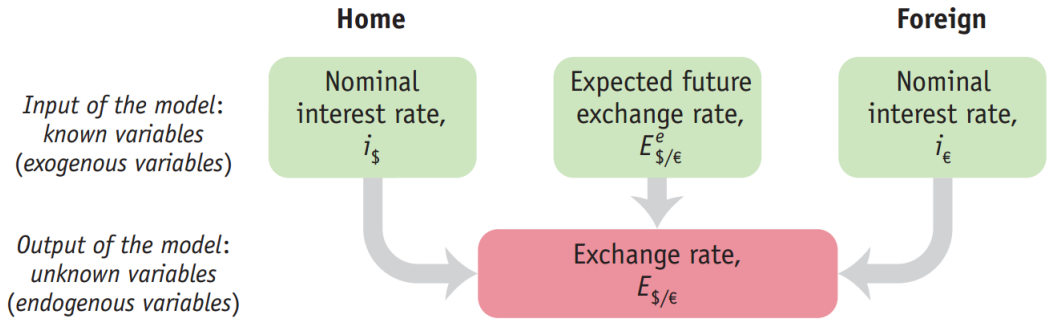
- 外汇是一种货币，还是一种资产?
- 由于投资者可以在本国债券 (存款) 和外国债券（存款）中实现转换，因此汇率可以被视为资产的相对价格
- 资产的价格由它的供给和需求决定
- 影响一项资产需求的因素有哪些？其中最重要的因素是什么?

本节的内容就是从资产的视角来讨论汇率的决定，可以称为**汇率的资产理论（asset approach to exchange rates**

Arbitrage and Interest Rates

- Overview of the two kinds of arbitrage
  - Exchange rate risk refers to changes in the value of an asset due to a change in the exchange rate.
- Risky arbitrage 风险套利
  - Investor does not cover the risk and invests according to the current and expected future exchange rate.
  - Since the future spot exchange rate is not know, there is exchange rate risk –the investor is not covered against this risk
  - No-arbitrage condition is known as uncovered interest parity (UIP).
- Riskless arbitrage 无风险套利
  - Investor covers the risk of the exchange rate changing in the future by using a forward contract.
  - No exchange rate risk because there is no chance the exchange rate on the contract will change.
  - No-arbitrage condition is known as covered interest parity (CIP).

Building Block of UIP



The Demand for Currency

- Most important determinant of demand: belief about future value
  1. Expected rate of return
  2. Expected future exchange rate
- Rate of return definitions:
  - **Rate of return:** the % change in value that an asset offers during a time period
  - **Real rate of return:** inflation-adjusted rate of return
  - if inflation=0 $\Rightarrow$ rate of return=real rate of return

Some other considerations

- In addition to expected return, investors care about:
  1. *risk*: Uncertainty about future real returns
  2. *liquidity*: Ease of selling currency?
- For now, we will ignore these considerations
- Assume certain knowledge of future, and liquid market

Comparing assets

Example: Should we invest in a US bond or a Euro bond?

- Return of 1 USD in US bonds in US $\Rightarrow R_{USD,t}$
- Return of 1 USD in Euro bonds in US: $\Rightarrow \left(\frac{E^e_{USD/EURO,t+1}}{E_{USD/EURO,t}}\right)(1+R_{EURO,t})-1$

A convenient approximation

- Return of 1 USD in Euro bonds in US: $\left(\frac{E^e_{USD/EURO,t+1}}{E_{USD/EURO,t}}\right)(1+R_{EURO,t})-1$
- Some algebra: $R_{EURO,t}+\frac{E^e_{USD/EURO,t+1}-E_{USD/EURO,t}}{E_{USD/EURO,t}}+R_{EURO,t}\frac{E^e_{USD/EURO,t+1}-E_{USD/EURO,t}}{E_{USD/EURO,t}}$
- Final term is usually small
- Return of 1 USD in Euro bonds in US is approximately $R_{EURO,t}+\frac{E^e_{USD/EURO,t+1}-E_{USD/EURO,t}}{E_{USD/EURO,t}}$
- Euro interest rate plus the rate of depreciation of the USD against the Euro

Using our approximation

- Approximation $R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$
- Buy the USD bond if: $R_{USD,t} - R_{EURO,t} - \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}} > 0$

Case studies

TABLE 14-3 Comparing Dollar Rates of Return on Dollar and Euro Deposits

Case	Dollar Interest Rate $R_\$$	Euro Interest Rate $R_€$	Expected Rate of Dollar Depreciation against Euro $\frac{E_{\$/€} - E_{\$/€}}{E_{\$/€}}$	Rate of Return Difference between Dollar and Euro Deposits $R_\$ - R_€ - \frac{(E^e_{\$/€} - E_{\$/€})}{E_{\$/€}}$
1	0.10	0.06	0.00	0.04
2	0.10	0.06	0.04	0.00
3	0.10	0.06	0.08	−0.04
4	0.10	0.12	−0.04	0.02

小结

- We have seen who trades currency
- We have seen how currency is traded
- We have seen what drives currency demand
- Now (partial) equilibrium in the financial market

Before we begin

- Need to know how people form beliefs about future interest rates
- This is the concern of the next two chapters (next session)
- For now future exchange rate taken as given

Interest rate parity

- In equilibrium, all assets should give the same expected return
- Why?
- Using our approximation: $R_{USD,t} = R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$

Interest rate parity

In other words, arbitrage ensures that the domestic interest rate equals the foreign interest rate plus the expected percentage depreciation of the domestic currency.

- $E^e_{USD/EURO,t+1} = E_{USD/EURO,t} \Rightarrow R_{USD,t} = R_{EURO,t}$

Effect of current exchange rates on return

- All else equal (including future exchange rate)
  - Current depreciation of *USD* lowers the *USD* return on Euro bonds
  - Appreciation of *USD* raises the *USD* return on Euro bonds
- Intuitive, because depreciation means one can buy less Euros today!

Effect of current exchange rates on return

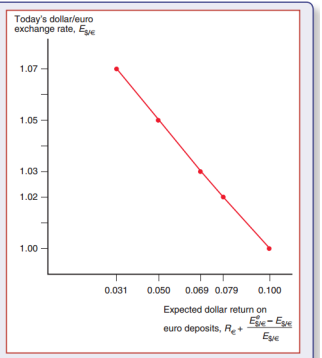
TABLE 14-4 Today's Dollar/Euro Exchange Rate and the Expected Dollar Return on Euro Deposits When $E_{\$/€^e} = \$1.05$ per Euro

Today's Dollar/Euro Exchange Rate	Interest Rate on Euro Deposits	Expected Dollar Depreciation Rate against Euro	Expected Dollar Return on Euro Deposits
$E_{\$/€}$	$R_€$	$\frac{1.05 - E_{\$/€}}{E_{\$/€}}$	$R_€ + \frac{1.05 - E_{\$/€}}{E_{\$/€}}$
1.07	0.05	−0.019	0.031
1.05	0.05	0.00	0.05
1.03	0.05	0.019	0.069
1.02	0.05	0.029	0.079
1.00	0.05	0.05	0.10

Table 14-3: Comparing Dollar Rates of Return on Dollar and Euro Deposits

- Same thing in a chart rather than a table
- Remember, keep future exchange rates fixed

FIGURE 14-3
The Relation between the Current Dollar/Euro Exchange Rate and the Expected Dollar Return on Euro Deposits
Given that $E^e_{\$/€} = 1.05$ and $R_€ = 0.05$, an appreciation of the dollar against the euro raises the expected return on euro deposits, measured in terms of dollars.



Equilibrium in the Foreign Exchange Market

The 'Equilibrium Exchange Rate'

- Assume that the USD interest rate R_{USD}, the Euro interest rate R_{EURO}, and the expected future USD/EURO exchange rate E_e, are all given
- Basically, solve our parity condition for $E_{USD/EURO,t}$

$$R_{USD,t} = R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$$

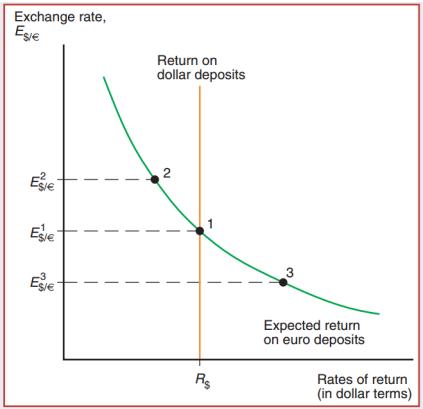
Equilibrium exchange rate

$R_{USD,t} = R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$ 美元兑欧元的即期汇率由三个因素决定：两国存款利率、预期汇率

FIGURE 14-4

Determination of the Equilibrium Dollar/Euro Exchange Rate

Equilibrium in the foreign exchange market is at point 1, where the expected dollar returns on dollar and euro deposits are equal.



Changing interest rates and exchange rate

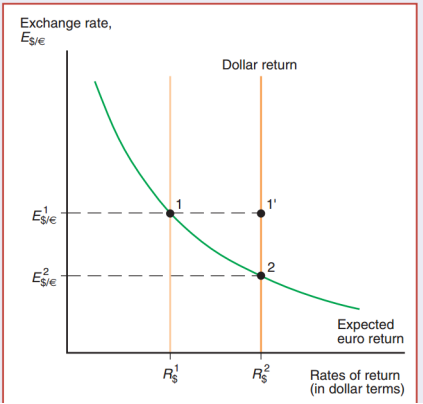
$$R_{USD,t} = R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$$

- Rise in interest rate results in current currency appreciation

FIGURE 14-5

Effect of a Rise in the Dollar Interest Rate

A rise in the interest rate offered by dollar deposits from $R^1_{\$}$ to $R^2_{\$}$ causes the dollar to appreciate from $E^1_{\$/€}$ (point 1) to $E^2_{\$/€}$ (point 2).



Changing interest rates and exchange rate

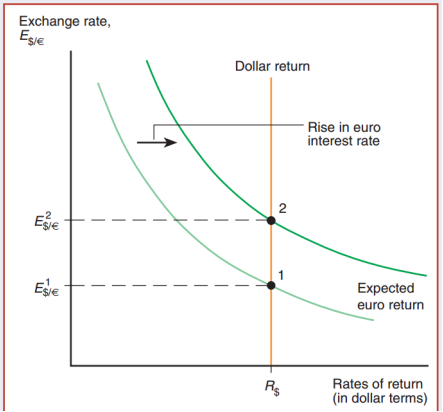
$$R_{USD,t} = R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$$

- Rise in interest rate of Euro results in current currency deppreciation

FIGURE 14-6

Effect of a Rise in the Euro Interest Rate

A rise in the interest rate paid by euro deposits causes the dollar to depreciate from $E^1_{\$/€}$ (point 1) to $E^2_{\$/€}$ (point 2). (This figure also describes the effect of a rise in the expected future \$/€ exchange rate.)



Changing future exchange rate and current exchange rate

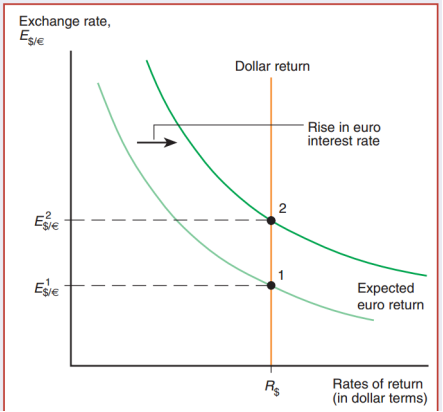
$$R_{USD,t} = R_{EURO,t} + \frac{E^e_{USD/EURO,t+1} - E_{USD/EURO,t}}{E_{USD/EURO,t}}$$

- a rise in the expected future exchange rate causes a rise in the current exchange rate

FIGURE 14-6

Effect of a Rise in the Euro Interest Rate

A rise in the interest rate paid by euro deposits causes the dollar to depreciate from $E^1_{\$/€}$ (point 1) to $E^2_{\$/€}$ (point 2). (This figure also describes the effect of a rise in the expected future \$/€ exchange rate.)



Riskless Arbitrage: Covered Interest Parity

- Forward Exchange Rate
  - The price of forward contracts.
  - Forward contracts allow investors holding deposits in foreign currencies to be certain about the future value of these deposits (measured in home currency).
  - No exchange rate risk in the future.
- Riskless arbitrage implies that the rate of return on identical investments in two different locations will generate the same rate of return.

Example

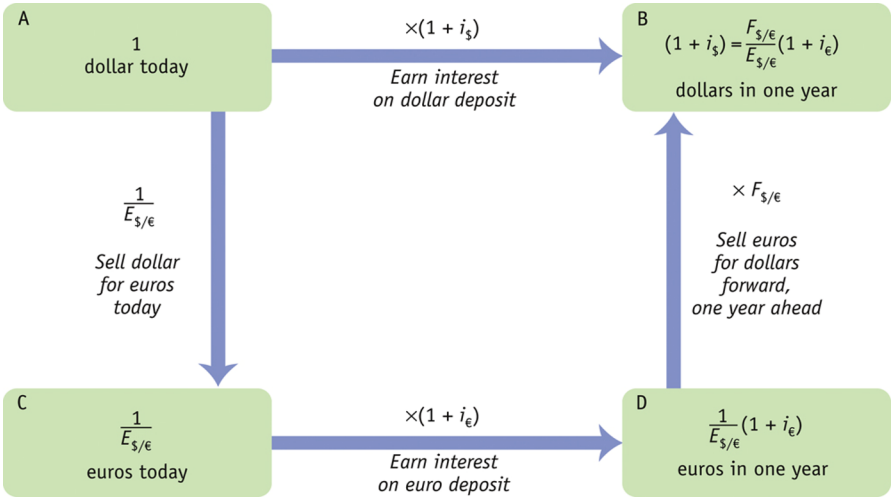
- Consider investing \$1 in a bank deposit in two places: New York and Europe.
  - In one year, you will earn a $(1 + i_{\$})$ rate of return in dollars in the account in New York.
  - In one year, you will earn a $(1 + i_{€})$ rate of return in euros in the account in Europe.
- Not comparable! Different currencies!
- We must calculate the dollar return in Europe:
  - Today, one U.S. dollar buys $1/E_{\$/€}$ euros.
  - In one year, you will have $(1 + i_{€})/E_{\$/€}$ euros.
  - You do not know the $E_{\$/€}$ spot exchange rate that will prevail in one year when you convert your euros back into U.S. dollars
  - You may choose to employ a forward contract to cover this risk.
  - In this case, your rate of return on the European deposit would be $(1 + i_{€})F_{\$/€}/E_{\$/€}$ U.S. dollars.
- Riskless arbitrage implies these two strategies will yield the same rate of return in dollars

Covered Interest Parity (CIP) condition

- No arbitrage condition
- For the market to be in equilibrium the riskless returns must be equal when expressed in a common currency:

$$\underbrace{(1+i_{\$})}_{\substack{\text{gross dollar return}\\ \text{on dollar deposits}}} = \underbrace{(1+i_{€})\frac{F_{\$/€}}{E_{\$/€}}}_{\substack{\text{gross dollar return}\\ \text{on euro deposits}}}$$

Riskless Arbitrage: Covered Interest Parity



What Determines the Forward Rate?

- Covered interest parity is a no-arbitrage
- covered interest parity can be seen as providing us with a theory of what determines the forward exchange rate condition

$$F_{\$/€} = E_{\$/€}\frac{1 + i_{\$}}{1 + i_{€}}$$

- In practice, this is exactly how the forex market works and how the price of a forward contract is set.
- CIP 和 UIP 分别确定了及其和远期汇率，但是它们都是基于利率水平的，那么利率又是如何确定的呢？next chapter

Summary

- Chapter 13:
  - National income accounting
  - Measuring value of a nation's annual production
  - Balance of payments accounting
  - Measuring a nation's debt to other countries
- Chapter 14:
  - Currency markets
  - Currency demand
  - Interest rate parity
  - Partial equilibrium ex. rate determination

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