

EE 452 International Monetary Economics  
**2. Foreign Exchange Market**  
(Part 2)

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## Outline

- ☞ Exchange Rate Risk
- ☞ Forward Foreign Exchange
  - ☞ Hedging
  - ☞ Speculation
- ☞ International Financial Investment
- ☞ International Investment with Cover)
  - ☞ Covered Interest Arbitrage
  - ☞ Covered Interest Parity
- ☞ International Investment without Cover
  - ☞ Expected Uncovered Interest Differential (EUD)
  - ☞ Uncovered Interest Parity (International Fischer Effect)
- ☞ Interest Parity

## Objectives of this Topic

- Understand the risks in foreign exchange market
- Understand the arbitrage without risks (Covered) and with (Uncovered)
- Understand the difference between spot exchange rate and forward exchange rate
- Able to explain the relationship between forward exchange rate and expected future spot rate
- Able to explain the relationships between spot rate, forward exchange rate and international interest rates

## EXCHANGE-RATE RISK

## Exposure to *Exchange Rate Risk*

- You are exposed to exchange rate risk if the value of your income or wealth or net worth will change if exchange rates in the future change in ways that are *not expected*. Examples:
  - If you travel to Japan and bring Baht to convert into yen as needed to pay for your expenses, you are exposed to exchange rate risk.
  - If you purchase a Chinese stock, you baht value of your investment not only depends on the market value of your Chinese stocks (valued in yuan), but also on changes in the baht value of yuan.

## Dealing with *Exchange Rate Risk*

- Hedging (การป้องกันความเสี่ยง) means taking an action to reduce your exposure to exchange rate risk.
- Speculation (การเก็งกำไร) means taking an action that increases your exposure to exchange rate risk, usually to try to gain profit from your belief about what future exchange rates will be.

## BASICS IN THE FORWARD FOREIGN EXCHANGE

## Ways to Hedge

- Buying foreign currency denominated traveler's cheques when travelling abroad.
- At a larger scale, international traders in goods and services often prefer forward foreign exchange contract.

## Forward foreign exchange contract

- Forward foreign exchange contract (สัญญาซื้อขายเงินตราต่างประเทศล่วงหน้า) is an agreement to exchange one currency for another on some date in the future at a price set now.
  - The price is called “forward exchange rate” (อัตราแลกเปลี่ยนล่วงหน้า).

## Financial jargons

- “Long position” means holding net assets in the foreign currency.
- “Short position” means holding net liabilities in the foreign currency. That is, owing more of the foreign currency than one holds.
- In financial jargon, hedging means reducing both kinds of “open” positions in a foreign currency.

## Ways to Speculate

- Speculating means committing oneself to an uncertain future value of one's net worth in terms of home currency.
- Example: Today, current spot rate for GBP is 47 Baht/GBP 1.
  - You expect that in 30 days, it will be 40 Baht. Given the forward rate today is 46 Baht, you purchase a forward contract to buy GBP 1 million.
  - You go on a vacation and 30 days later, you instruct the bank to settle the forward contract against the actual spot rate which turns out to be 40 Baht as you expected.
    - You buy at 40 Baht and sell at 46 Baht.
    - Your net profit is  $(46-40) \times 1 \text{ million} = 5 \text{ million Baht}$ .
  - If you are smarter than the others in the marketplace, you can get rich using the convenient forward exchange market
  - But...what if your prediction was wrong?
  - What if many people expect the spot exchange rate value of the GBP to depreciate to 40 Baht like you?

## Speculation

- Generally, all speculators will not have the exact same view as to the expected future spot exchange rate.
- *Hence, we hypothesise that speculators' pressures on supply and demand should drive the forward exchange rate to equal the average expected value of the future spot exchange rate.*
  - This is similar to the point spread in football betting, which is the number of points by which the average bettor expects the stronger team to win.

# INTERNATIONAL FINANCIAL INVESTMENT

## International Financial Investment

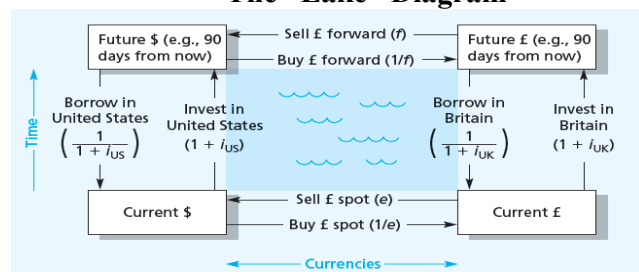
- Decisions about international investments are based on the returns and risks of the available investment alternatives.
- Generally, potential investors would ask the following questions:
  - How do we calculate the overall returns on financial assets denominated in foreign currencies?
  - What are the sources of risk that apply specifically or especially to foreign financial investments?
  - Can the investor hedge exposure to exchange-rate risk?

## Example: A Thai investor buying US financial assets

- What exchange rate can be used to convert USD back into THB a year from now?
- You have two alternatives (based on hedging and speculation):
  - Covered international investment using forward exchange rate: you can contract now for the exchange of USD back into THB at 1-year forward exchange rate using the forward exchange contract.
    - You have hedged your exposure to exchange-rate risk.
  - Uncovered international investment: you can wait and convert back into dollars at the future spot exchange rate, the rate that will exist one year from now.
    - You do not know for sure what this future spot exchange rate will be, so your investment is exposed to exchange-rate risk.

## INTERNATIONAL INVESTMENT WITH COVER

## Domestic Investment vs Covered International Investment: The “Lake” Diagram



- People moving their assets from left to right are buying GBP and selling USD; and vice versa.
- People moving upward are investing or lending; people moving downward are either selling off interest-earning assets or borrowing at interest.
- Exchange rates,  $e$  and  $f$ , quoted as USD/GBP
- Example: Suppose you want to convert your current USD to future USD, there are two routes: (1) through UK to get  $(1+i_{UK}) \cdot f/e$  or (2) simply invest in US to get  $(1+i_{US})$  future dollars for every present dollar.
  - Which road we should take depends on the sign of the difference between the two returns

## Covered Interest Differential (CD)

- Covered interest differential is the difference in returns between domestic investment and covered international investment.
- $CD = (1 + i_{UK}) \cdot \frac{f}{e} - (1 + i_{US})$ 
  - If the CD is positive, one is better off investing in UK (abroad).
  - If CD is negative, one should avoid investments in UK, investing in US (domestic) instead.
- This is “covered” because the investor is fully hedged or covered against exchange-rate risk if he uses a foreign-currency investment to get from his own currency today to the same currency in the future.

## Forward Premium (F)

- Forward premium is the proportionate difference between the current forward exchange-rate value of the GBP and its current spot value:
- $F = (f - e)/e$
- The F (converted into a percentage) shows the rate at which the GBP gains value between a current spot transaction to buy GBP and future selling of GB at the forward rate that we can lock today.
  - If F is negative, the GBP is at a forward discount because it loses value between buying it at the current spot rate and selling it at the current forward rate.

## CD and F

- The handy approximation is that the CD is approximately equal to the F on the GBP plus the interest rate differential:
- $CD = F + (i_{UK} - i_{US})$
- The formula shows that the net incentive to go in one particular direction around the lake depends on how the forward premium on the pound compares with the difference between interest rates.

## Covered Interest Arbitrage

- Covered interest arbitrage means buying a country's currency spot and selling that country's currency forward, to make a net profit from the *combination* of the difference in interest rates between countries and the forward premium on that country's currency.
- This is essentially riskless.

## Example: Covered Interest Arbitrage

- $i_{UK} = 0.04$ ,  $i_{US} = 0.03$  for 90 days.
- $e = f = \text{USD2/GBP}$ ;  $F = 0$
- Hence,  $CD = 0.01$ .
- A New York arbitrageur sells USD 20 million in spot market in exchange for GBP 10 million. He used it to buy UK treasury bills that will mature in 90 days.
- After 90 days, he will get GBP 10 million  $\times 1.04 = \text{GBP}10.4$  million
- He exchanges to USD 20.8, the net profit would be after minus the US interest foregone and admin costs.
- *What happens if many people take advantage of an opportunity for interest arbitrage?*
  - The spot exchange rate will rise above or fall below USD2/GBP.
  - As arbitrageurs move to GBP-denominated investment, US interest rates will rise and UK interest rates tend to fall; and vice versa.

## Covered Interest Parity

As a result of pressure from covered interest arbitrage:

- Covered interest parity (อัตราดอกเบี้ยเสมอภาค): The domestic return equals the overall return on a covered foreign investment.  $CD = 0$ .
- That is, approximately: The forward premium on the foreign currency equals the difference between the foreign interest rate and the domestic interest rate.

## Covered Interest Parity

- A currency is at a forward premium (discount) by as much as its interest rate is lower (higher) than interest rate in the other country.
  - $F = i_{US} - i_{UK}$  in the example
- The overall covered return on a foreign-currency investment equals the return on a comparable domestic-currency investment.
  - $F + i_{UK} = i_{US}$
- Covered Interest Parity links together 4 rates:  $F$ ,  $e$ ,  $i_{UK}$ ,  $i_{US}$ . If one of these rates changes, then at least one of the other rates also must change to maintain covered interest parity.



## Example: Expected Uncovered Interest Differential

- $i_{UK} = 0.04$ ,  $i_{US} = 0.03$  for 90 days.
- $e = e^{ex} = \text{USD2/GBP}$
- Hence,  $EUD = 0.01$  -> in favour of GBP investment.
- If an uncovered foreign financial investment is exposed to exchange-rate risk, why would anyone want to invest uncovered?
  - Return: The expected overall return on the uncovered investment may be higher than the return that can be obtained at home (EUD is positive).
  - Risk: The exchange-rate risk (future spot rate might be lower than expected) that is expected to be compensated by the overall return.
  - Risk diversification: In the whole portfolio, the addition of an uncovered foreign investment can sometimes increase overall riskiness, but in other cases, it can lower risks because of the benefits of diversification of investments.

## Uncovered Interest Parity

- Generally, the pressures on the rates will subside only when there is no further incentive for large shifts in investments.
- Uncovered Interest Parity (International Fisher Effect) is the condition when  $EUD = 0$

## Uncovered Interest Parity

- A currency is expected to appreciate (depreciate) by as much as its interest rate is lower (higher) than the interest rate in the other country (for example: expected appreciation of the GBP =  $i_{US} - i_{UK}$ )
- The expected overall uncovered return on the foreign-currency investment equals the return on the domestic-currency investment (expected appreciation of GBP +  $i_{UK} = i_{US}$ )

## Uncovered Interest Parity

- If UIP holds, it links together four rates:  $e$ ,  $e^{ex}$ ,  $i_{UK}$ ,  $i_{US}$ .
- As with CIP, if one of these four rates changes, then at least one of the other rates must change to maintain or reestablish UIP.

## Example: UIP

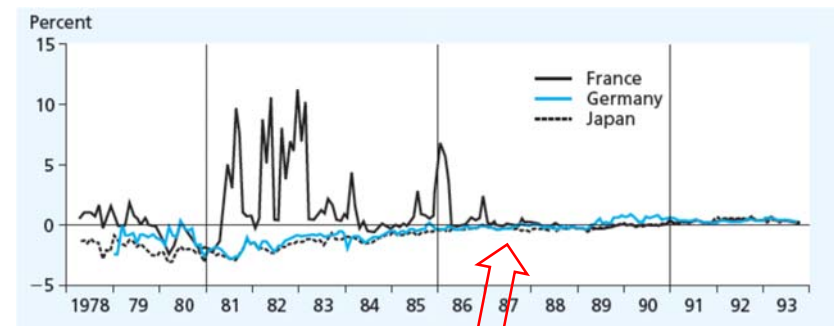
- If the interest rate in the UK increases, this can increase  $e$ , thus, reducing the expected rate of GBP appreciation (assuming that  $e^{ex}$  is unchanged)
- If the value of  $e^{ex}$  increases and there is no change in interest rates, then  $e$  must increase to maintain the same rate of further GBP appreciation expected into the future.

## EMPIRICAL EVIDENCE ON INTEREST PARITY

## Covered Interest Parity

- CIP states that the forward premium should be (approximately) equal to the difference in interest rates.

## Covered Interest Differentials: The U.S. Against Germany, Japan, and France, 1978-1993



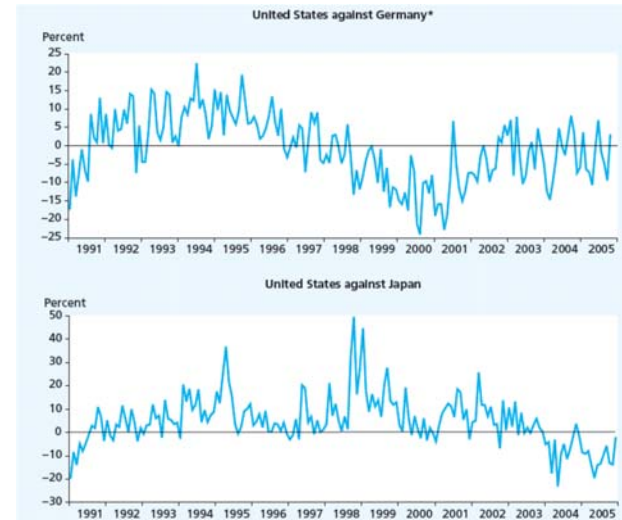
Source: Pugel (2012), p. 433

Covered interest parity has held between the US and selected countries since the mid-1980s

## Uncovered Interest Parity

- UIP states that the expected rate of appreciation of the spot exchange-rate value of a currency should (approximately) equal the difference in interest rates.

## Uncovered Interest Differentials: The U.S. against Germany and Japan, 1991-2005



- In both panels, it appears that market participants often expected large EUD. This suggests that UIP does not hold nearly as closely as does CIP.

## Why does UIP not hold perfectly?

- Exchange-rate risk matters: Investors will not enter into risky uncovered foreign investments unless they expect to be compensated adequately for the risk that this adds to their portfolios.
- Expectations of market participants about future spot exchange rates are biased. For some periods, the market participants are consistently expecting an exchange-rate change that is different from what will actually occur.
- UIP is useful at least as a rough approximation empirically, but it seems to apply imperfectly to actual rates.

## Key Terms

- Exchange-rate risk
  - Hedging
  - Speculation
- Forward exchange contract
  - Forward exchange rate
- Covered international investment
- Uncovered international investment
- Covered interest arbitrage, covered interest differential, covered interest parity
- Expected uncovered interest differential, uncovered interest parity