

Lecture 3

International business activity involves transactions and bookkeeping in different currencies. If exchange rates fluctuate, the value of a transaction or the value of assets and liabilities denominated in a foreign currency are not known *ex ante*. This creates exchange rate risk.

Different 'types' of exchange rates.

Exchange rate = price of one currency in terms of another

›The exchange rate between two currencies (e.g. EUR and \$) can be expressed in two ways:

1. The value of the Euro in terms of the \$: \$/EUR
2. The value of the \$ in terms of the Euro: EUR/\$

Definition used in the textbook: value of the foreign currency in terms of the *home currency*: HCU/FCU

A rise in the exchange rate implies an **appreciation** of the foreign currency and a **depreciation** of the home currency.

Effective exchange rate = weighted average of the values of a country's currency relative to various (major) currencies.

Spot rate = price of buying or selling a currency at this moment.

Forward rate = price of buying or selling a currency at a specific date in the future.

- Spot rate > forward rate: Foreign currency is cheaper in the future than today → Foreign currency is selling at a **forward discount**.
- Spot rate < forward rate: Foreign currency is more expensive in the future than today → Foreign currency is selling at a **forward premium**.

Nominal exchange rate (E) = the relative value of two currencies.

Real exchange rate (ϵ) = the relative value of two currencies adjusted for differences in product prices in the two countries.

Movements in the real exchange rate indicate changes in the international price competitiveness of a country's products.

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$\epsilon > 1$: foreign products are more expensive than domestic products (e.g. $\epsilon = 1.3$ → foreign products are 30% more expensive)

$\epsilon < 1$: foreign products are cheaper than domestic products (e.g. $\epsilon = 0.8$ → foreign products are 20% cheaper than domestic products.)

An increase in ϵ implies:

- Foreign prices have increased relative to domestic prices and/or
- The foreign currency has become more expensive.

This implies that the home country's products have become more competitive compared to the foreign country's products.

Analog for a fall in ϵ : Foreign products have become more competitive compared to home products.

The nominal exchange rate fluctuates a lot, but the real exchange rate is quite steady.

How international investment is influenced by exchange rate risk.

Types of exchange rate risk:

International business activity involves transactions and bookkeeping in different currencies.

1. **Transaction risk**: value of a transaction is unknown.

→ Main risk in exports/imports.

2. **Translation risk**: value of a firm's assets and liabilities are unknown.

→ Main risk in horizontal multinational activity.

Vertical multinational activity involves both types of risks.

How do firms and investors deal with the exchange rate risk?

1. Hedging = Seeking a balance between liabilities in foreign currency and assets in foreign currency (to cover the risk)

Example: Purchase of goods from U.S. payable in 30 days (\$- liability) → forward contract to buy \$ in 30 days (\$- asset) at predefined EUR/\$ rate → know in advance how many EUR to pay in 30 days: No risk!

2. Speculating = Taking over net asset or net liability positions in foreign currency to make a (potential) profit.

Example: Sign forward contract to sell \$ in 30 days at predefined EUR/\$ rate → if future spot rate is below the forward rate: Profit (pay few EUR to get \$ and sell \$ at high forward rate). "Buy currency at a low price and sell it at a high price."

Arbitrage = Taking advantage of price differences in two markets.

- Firm/individuals undertaking financial investment have the option to invest in domestic assets and foreign assets.
- If the rate of return between Home and Foreign (expressed in the same currency) is different, one can make a profit (= arbitrage opportunity).

How do we make foreign and domestic investment options comparable?

Convert earnings paid in foreign currency into home currency:

- Using the forward rate (F): **covered investment** (hedging)
- Using the expected future spot rate (E^e): **uncovered investment** (speculating)

Covered investment

Assumption: foreign and domestic assets are perfect substitutes.

› Invest in domestic assets (h): earn interest rate i_h

- › Invest in foreign asset (f): earn interest rate i_f

- › Investments in both assets have to be expressed in the same currency:

• 1 domestic currency unit (HCU) today is worth $1/E$ foreign currency units (FCU).

- 1 FCU earned in the future is worth F HCU.

1 HCU invested in domestic assets yields a gross return of:

1 HCU invested in foreign assets yields a gross return of:

$1/E = (\text{amount invested})$

$(1 + i_f) \cdot F = (\text{unit return expressed in HCU})$

For the foreign currency market to be in equilibrium, it has to be that foreign and domestic assets yield the same return (no arbitrage possibilities).

Covered interest parity condition:

(roughly equal)

Implications: Changes in the interest rates will trigger changes in the forward rate.

- Increase in i_f : Foreign assets more attractive \rightarrow increase in sales (supply) of foreign currency in forward market \rightarrow for. curr. depreciates in forward market ($F \downarrow$).
- Increase in i_h : Home assets more attractive \rightarrow fewer sales of foreign currency in forward market \rightarrow for. curr. appreciates in forward market ($F \uparrow$).
- Increase in E : Foreign asset less attractive \rightarrow fewer sales of foreign currency in forward market \rightarrow for. curr. appreciates in forward market ($F \uparrow$).
- Fall in E : Foreign asset more attractive \rightarrow more sales of foreign currency in forward market \rightarrow for. curr. depreciates in forward market ($F \downarrow$).

Uncovered investment

- Invest in domestic assets: earn interest rate i_h
- Invest in foreign asset: earn interest rate i_f
- Investments into both assets have to be expressed in the same currency:
- 1 domestic currency unit (HCU) today is worth $1/E$ foreign currency units (FCU).
- 1 FCU earned in the future is in expectations worth E^e HCU.

1 HCU invested in domestic assets yields a return of:

1 HCU invested in foreign assets yields an expected return of:

For the foreign currency market to be in equilibrium it has to be that foreign and domestic assets yield the same expected return (no arbitrage possibilities).

Uncovered interest parity condition:

(roughly equal)

Implications: Changes in the interest rates or in the expected spot rate will trigger changes in the current spot rate.

- Increase in i_h : Domestic assets now more attractive \rightarrow increased demand for domestic currency \rightarrow dom. curr. appreciates ($E \downarrow$).

- Increase in if: Foreign assets now more attractive → increased demand for foreign currency → for. curr. appreciates ($E \uparrow$).
- Rise in expected exchange rate (= expectation of future appreciation of for. curr.) → foreign assets more attractive → increased demand for foreign currency in today's spot market → for. curr. appreciate ($E \uparrow$).

The determinants of exchange rates in the short-run and in the long-run.

Exchange rates in the **short run**:

- In the short run, exchange rate movements are driven by the behavior of financial investors (supply and demand for financial assets).
- Uncovered interest parity implies a link between interest rates, expected and actual exchange rates.

Short-run exchange rate movements are driven by changes in interest rates and expected exchange rates. Anything that changes the expected return to foreign assets will trigger changes in the spot exchange rate.

Exchange rates in the **long run**:

- In the long run, exchange rate movements are driven by the demand and supply for different countries' products.
- If there are price differences between Home and Foreign on a tradable good, some people will take advantage of this.
- If many people do so, prices between Home and Foreign will converge.

A product that is easily and freely tradable should have the same price everywhere ($\epsilon = 1$) so that there are no international arbitrage opportunities:

Works well for heavily traded products (e.g. crude oil, gold, other metals.)

Purchasing Power Parity (PPP)

- Like the law of one price, but for a bundle of products:
- PPP holds when the exchange rate between two countries is equal to the ratio of their prices.
- The nominal exchange rate that makes PPP hold is called the PPP exchange rate.

Changes in the exchange rate are related to changes in countries' prices over time (= inflation):

Where π is the inflation rate.

Rate of change in exch. rate = Difference in inflation rates.

Exchange rates in the long run (cont.)

- In the long-run, exchange rate movements are driven by the demand and supply for different countries' products (PPP condition).
- Changes in domestic or foreign price levels will trigger adjustments of the exchange rate.

- Increase in P_h → domestic goods less competitive → more demand for foreign goods (imports) and foreign currency → foreign currency appreciates ($E \uparrow$).
- Increase in P_f → foreign goods less competitive → more demand for domestic goods (exports) and domestic currency → domestic currency appreciates ($E \downarrow$).
- **Absolute PPP** holds if the effective real exchange rate equals 1 (= 100%).
- **Relative PPP** holds if the effective real exchange rate is a horizontal line (movements in E follow movements in P_H and P_F so that the effective real exchange rate remains constant.)

Conclusion

- There is no upward or downward trend in the real effective exchange rate series: Relative PPP holds well in the long run.
- The level of the effective real exchange rate can be very different from 1: Absolute PPP does not hold.
- In the short run, the real effective exchange rate can be very different from its long-run trend: There are large deviations from PPP in the short run.

Reasons for short-run deviations from PPP:

- **Transaction costs** (e.g. transport cost): Not profitable to take advantage of small price differences.
→ Over time stronger arbitrage forces: the price gap closes and PPP is re-established.
- **Differentiated goods**: Foreign and domestic goods are similar, but not identical (Example: cars). No reason to expect they should trade at the same price.
→ In the long-run goods are closer substitutes: the price gap closes and PPP is re-established.
- **Fixed costs of trading**: Not profitable to take advantage of small price differences.
→ Over time stronger arbitrage forces: the price gap closes and PPP is re-established.
- **Non-traded goods**: Large share of income is spent on services which are (largely) not tradable. No reason to expect that PPP should hold in general.
- **Composition issues**: Price indices in different countries are constructed differently. Measured aggregate price levels can differ across countries even if the Law of One Price holds for every individual item in the 'basket'.