Lesson IX: Overview

1. Working within an international context: exposures and risks

2. Hedging techniques

Working within an international context: exposures and risks

Risk vs Exposure

Risk relates to the **variability in the values** of assets and liabilities, due to unexpected events and occurrences.

Exposure is the **amount at risk**.

Different Risks and Exposures

1. Foreign exchange risk and exposure

2. Operating risk and exposure

3. Country risk and exposure

Foreign exchange exposure I

Foreign exchange exposure: <u>sensitivity</u> of changes in the <u>real domestic currency value</u> of assets and liabilities to changes in exchange rates.

$$Exposure = \frac{\Delta V_{(DC)}}{\Delta S_{(DC\,/\,FC)}}$$

Foreign exchange exposure II

$$Exposure = \frac{\Delta V_{(DC)}}{\Delta S_{(DC\,/\,FC)}}$$

Measured in monetary terms [currency of measurement: $DC : \frac{DC}{FC} = FC$] $\rightarrow$ exposure on the same asset/liability varies depending on which currency is considered as domestic/foreign

Foreign exchange exposure III

1. Exposure on contractual assets and liabilities

2. Exposure on non-contractual assets and liabilities

Contractual assets and liabilities

Contractual assets/liabilities: assets or payment obligations with a **fixed** face value (e.g. bank accounts/deposits, accounts receivable/payable…)

Finding the FX exposure on contractual assets/liabilities

Suppose:

- €-denominated bank account = €1,000

- $S_{\$/€}$ from $1.1_{\$/€}$ to $1.2_{\$/€}$

$$Exposure = \frac{\Delta V_{(DC)}}{\Delta S_{(DC/FC)}} = \frac{.1 \cdot 1,000}{.1} = €1,000$$

What if we dealt with a bank loan?

Terminology

Long (short) position: an investor is long (short) in a currency if she or he gains (loses) when the spot value of the currency increases, and loses (gains) when it decreases.

Non contractual assets and liabilities

Non Contractual assets/liabilities: assets or payment obligations **without a fixed** face value (e.g. shares, foreign currency-denominated bonds…)

Finding the FX exposure on non contractual assets/liabilities I

Suppose:

- Shares (initial price)= €10

- The shares belong to a European company exporting to the USA

- $S_{\$/€}$ from $1.1_{\$/€}$ to $1.2_{\$/€}\rightarrow$ the € appreciation harms the exporting company's competitiveness: the shares' price drops to €9.50

Finding the FX exposure on non contractual assets/liabilities II

$$Exposure = \frac{\Delta V_{(DC)}}{\Delta S_{(DC/FC)}} = \frac{(1.2 \cdot 9.5) - (1.1 \cdot 10)}{.1} = \frac{11.4 - 11}{.1} = €4$$

The € appreciation has increased the $ value of the investment, although part of this benefit has been eroded due to the lower firm's competitiveness in int'l mkts.

Is the US investor long or short EUR? Why?

More on FX exposure and non contractual assets and liabilities

Exposure depends on the extent to which the currency value and the asset value are related

Co-variation between the FX rate and the foreign currency value of assets

Foreign currency-denominated bonds and FX exposure I

Suppose:

- Bond (initial price)= €1000

- The ECB follows a policy of "leaning against the wind"

- $S_{\$/€}$ from $1.1_{\$/€}$ to $1.2_{\$/€}$→ after the € appreciation, the ECB lowers the interest rates, thus forcing bonds' prices up to €1,050

Foreign currency-denominated bonds and FX exposure II

$$Exposure = \frac{\Delta V_{(DC)}}{\Delta S_{(DC/FC)}} = \frac{(1.2 \cdot 1,050) - (1.1 \cdot 1,000)}{.1} = \frac{1,260 - 1,100}{.1} = €1,600$$

The exposure is larger than the value of the bond

Foreign exchange risk

Exchange rate risk: standard deviation of domestic currency values of assets or liabilities attributable to unanticipated changes in exchange rate.

Exposure, Risk and CIRP

$$(1 + r_D)^n = \frac{F(_nD/F)}{S(_D/F)} (1 + r_F)^n$$

Assume that the foreign currency-denominated security is <u>held to maturity</u> (when the fwd contract also expires). Does this transaction bear any FX exposure/risk?

Exposure, Risk and PPP

Suppose that $\Delta S = \Delta P_D - \Delta P_F$ holds and assume a positive inflationary shock occurs in the foreign country. Will a domestic investor have to face any FX risk/ exposure on a real estate investment? Why?

Operating exposure I

Operating exposure: effects of exchange rates on revenues, costs (and, consequently, profits).

Does a domestic firm with no direct business relationships abroad face operating risk?

Operating exposure II

Operating exposure is very difficult to eliminate.

Also referred to as "*Residual FX exposure*"

Operating exposure: the effects of exchange rates on exporters

<u>Exporters</u>

- After devaluation (and assuming non-tradable inputs), export prices (expressed in home currency terms)↑, export volumes↑, total revenues (in domestic currency) ↑→ **short run implications**;

- The entry of new firms and/or the general inflation brought about by devaluation gradually erode the increased profits→ **long run implications**

Would these conclusions remain unchanged if inputs were tradable?

Operating exposure: the effects of exchange rates on importers

Importers

- After devaluation, import prices rise while the overall quantity of imports falls. This causes a decline in profits
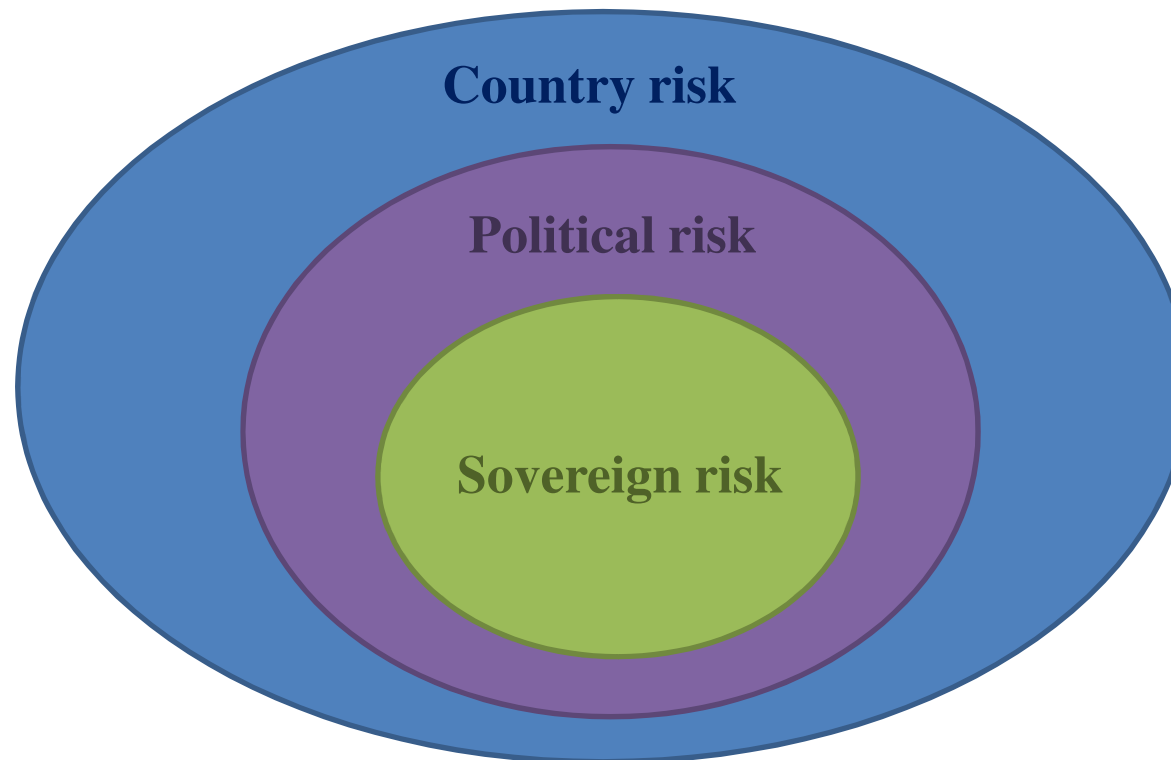
Country risk I

Country risk: possibility of <u>losses</u> due to <u>country-specific</u> economic, political and social <u>events</u>

Uncertainty surrounding payments from abroad or assets held abroad due to the possibility of war, revolution, asset seizure, or other similar events.

Country risk II

Country risk III

Sovereign risk: possibility of losses on claims to foreign governments or government agencies.

Political risk: additional possibility of losses on private claims (including FDIs).

Country risk IV

- **Confiscation** (Government takeover without compensation);

- **Expropriation** (Government takeover with compensation);

- **Wars**, **revolutions**;

- **Changed legal environment** (restrictions on income repatriation, tax regimes…)

Country risk V

Euromoney's country risk rating scheme

Several specialists are asked to give their opinions on each country based on a few pre-selected factors (indicators):

- Analytical indicators→ economic and political-risk evaluations;
- Credit indicators→ measures of a country's credit worthiness (ability to service debt);
- Market indicators→ measures of a country's access to bank loans, short term credits and bond mkts.

Euromoney's country risk rankings I

Top 10 largest deteriorations in country risk scores (score out of 100)

Source: Euromoney Country risk September 2011[1]

Rank	Country	Pre-crisis score	Sept 2011 score
1	Indonesia	73.2	58.2
2	Greece	82.7	40.6
3	Malaysia	84.5	66.6
4	Russia	50.7	56.9
5	Ireland	92.4	60.8
6	Argentina	53.8	43.7
7	Thailand	82.1	61.7
8	South Korea	85.0	73.3
9	Portugal	83.0	55.9
10	Spain	86.6	66.0

Euromoney's country risk rankings II

Mean Country Risk, March 2000 - March 2011, Euromoney data

7.34   98.1
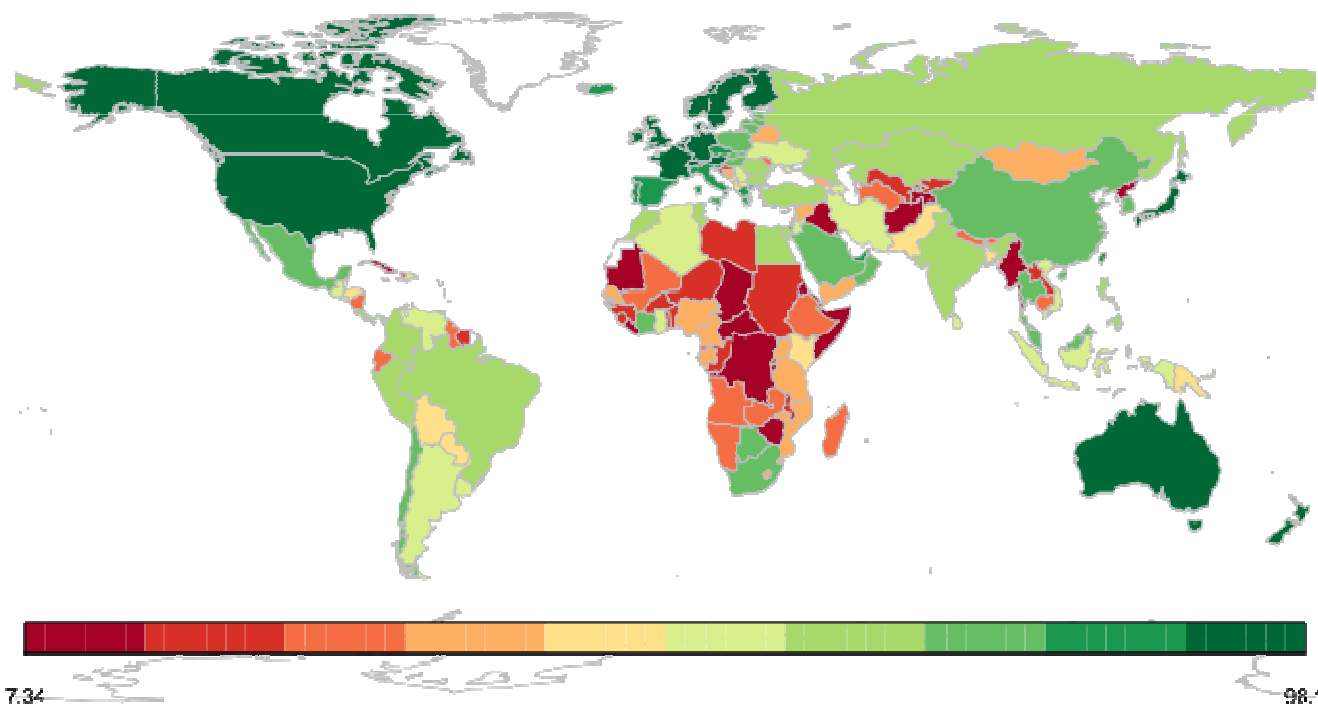
Risk and Exposure: ST vs LT

Risk and exposure are different in the short/long run

As time goes by, markets provide some "natural" forms of hedge:

- Parity relationships hold better in the long term;

- Overshooting reactions tend to be gradually reabsorbed;

- Economic policies (purposely implemented to counteract FX fluctuations) become fully effective

How to survive the short run?

Hedging techniques

Hedge

Hedge (cover): to take steps to isolate assets, liabilities, or income streams from the consequences of changes in one or more pre-identified risk factors

Available hedging techniques

There are several available hedging mechanisms.

Widespread solutions:

1. Forwards
2. Futures
3. Options
4. Borrowing and lending
5. Currency of invoicing, predictive accuracy of cash flows, selection of supplying country

Hedging via the forward market

Basic rationale: buying/selling a forward contract eliminates the uncertainty about future exchange rate dynamics

The costs of forward hedging I

Let's define

Expected cost of hedging $= F_{D/F} - E[(S_{D/F})]$

Under the risk neutrality-zero transaction costs asspts, it must be

$$F_{D/F} = E[(S_{D/F})]$$

so that Expected cost of hedging $= 0$

The costs of forward hedging II

Relaxing the risk neutrality asspt

$$F_{D/F} - E(S_{D/F}) \neq 0$$

Risk premium

The costs of forward hedging III

Relaxing the zero transaction costs asspt

$$F_{D/F} - E(S_{D/F}) \neq 0$$

The *bid-ask spreads* on *forward exchange* are *larger* than those on *spot exchange* transactions.

This depends on the risk of unexpected FX rates fluctuations that might affect a (still) uncovered fwd position a bank has taken in the fulfillment of its market making obligations→ such a risk is higher in fwd mkts, due to their thinness

The benefits of forward hedging[1]

- Even assuming there is a risk premium to be paid for hedging, the expected cost of hedging is matched by the benefit of eliminating uncertainty;

- Transaction costs are generally quite small;

- Hedging tends to reduce bankruptcy costs as well as refinancing costs;

- Hedging helps reduce the volatility of receipts, payments and profits

1. Please, notice this will hold as well for all the other hedging techniques

Hedging via the futures market

Basic rationale: futures hedging works very much the same as forward hedging apart from the daily marking-to-market procedure

The costs of futures hedging I

Basically related to the marking-to-market risk

Interest rates earned on the margin account may vary during the contract's life, so that there is no exact match with a forward contract's payoff profile

The costs of futures hedging II

Dealing with the marking-to-market risk

Suppose you have to buy 1mio £ sometime into the future and assume further that $E[S_{\$/£}]=1.5_{\$/£}$. At maturity:

Forward	Futures
Assuming $S_{\$/£}$ turns out to be $1.7_{\$/£}$, you pay only 1.5 mio \$, thus realizing a 0.2 mio \$ gain	Assuming $S_{\$/£}$ turns out to be $1.7_{\$/£}$, you still have to pay 1.7 mio \$ to purchase GBP. However, considering the (**approximate**) 0.2 mio \$ gain on the margin account, you end up paying **roughly** 1.5 mio\$→ marking to mkt risk

Hedging via the option market

Basic rationale: buying a call (put) option allows you to put a cap (floor) on the amount to be paid (received) in the future, while granting you a further chance of benefiting from the exchange rate ending up below (above) the strike price

The costs of option hedging

Options give their holder the possibility, **NOT the obligation**, of buying or selling

Very desirable feature that generally implies a higher purchasing cost if compared to forward and futures

Watch out

The choice among options with different strike prices depends on whether the hedger wants to insure only against very bad outcomes for a cheap option premium (by using an out-of-the money option) or against anything other than very good outcomes (by using an in-the-money option).

Hedging via borrowing and lending

Basic rationale: if we combine the spot exchange rate with borrowing and lending, we can replicate a fwd's payoff profile (CIRP)

The costs of borrowing and lending hedging

Hedging with borrowing and lending is generally more expensive than hedging with a forward contract

- Bid-ask spread on the spot FX rate
- Borrowing-investment spread on the interest rates

Hedging against country risk I

There are no precise hedging mechanisms to avoid country risk

Most of the available options are just strategic business choices that can help eliminate/reduce country exposure

Hedging against country risk II

- Keeping control of key corporate operations;

- Planned divestments;

- Joint Ventures;

- Local debt;

- Investment insurances

Hedging against country risk III

Keeping control of key corporate operations

Domestic investors try to maintain full control of crucial activities and, more generally, take steps to prevent key operations from being able to run without their cooperation

Planned divestments

The owner of an FDI can agree to turn over ownership and control to local people at a specific time in the future

Hedging against country risk IV

Joint Ventures

Shared ownership of an investment, instituted because of the need for a large amount of capital or to reduce the risk of confiscation or expropriation.

Local debt

The risk of expropriation or confiscation can be significantly reduced by borrowing within the country where the investment occurs→ notice, however, that the higher the country risk, the less developed the domestic K mkts

Hedging against country risk V

Investment insurances

Many countries will insure their companies that invest overseas against losses from political events (currency inconvertibility, expropriation, war, revolution...)

To put it into practice I

- A US investor buys a USD-denominated bond. Does he have to face any FX exposure? Why? Please, explain.
- The treasurer of the XYZ company based in Country 1 is expecting a dividend payment of 10 mio Currency 2 from a subsidiary located in Country 2 in two months. His/her expectations of the future Currency 1/ Currency 2 spot rate are mixed: Currency 2 could strengthen or stay flat over the next two months. The current exchange rate is Currency 1 0.63/Currency2. The two-month futures rate is at Currency 1 0.6279/Currency2. The two-month Country 2 interest rate is 7.5%. The two-month Country 1 T-Bill yields 5.5%. Puts on Currency 2 with maturity of two months and strike price of Currency 1 0.63/Currency2 are traded on the CME at Currency 1 0.0128. Compare the following choices offered to the Treasurer:

To put it into practice II

I.   Sell a futures on Currency 2 for delivery in two months for a total amount of 10 mio Currency 2.

II. Buy 80 put options on the CME with expiration in two months and strike price equal to the current price (Assume that 1 put option is for 125000 Currency 2).

III. Set up a forward contract with the firm's bank XYZ

A.   What is the respective cost of each strategy?

B.   Which strategy would best fit the treasurer's mixed forecast for the future spot rate of Currency 2?