Lesson II: Overview

1. Foreign exchange markets: everyday market practice

2. Forward foreign exchange market

Foreign exchange markets: everyday market practice

Getting started I

The exchange rates printed in financial newspapers are normally mid-rates, standing half way between the quoted bid-ask rates.

- **Bid**: rate at which a certain market player is willing to buy

- **Ask**: rate at which a certain market player is willing to sell

Bid rate < Ask rate

Getting started II

Ask rate - Bid rate = Bid/Ask Spread

The bid-ask spread can be conceived as a transaction cost.

Getting started III

Apart from two notable exceptions (GBP and EUR), all the other major currencies are quoted in European terms, that is foreign currency per USD

F/USD → think of these exchange rates as the buying and selling prices of US dollars.

Getting started IV

For instance, **CHF/ bid**$ is the rate at which a certain mkt player is willing to buy USD against CHF and **CHF/ ask$** is the rate at which the same mkt player sells USD against CHF.

CHF/ bid$ < CHF/ ask$

Getting started V

Conversely, EUR and GBP are quoted in USD equivalent

USD/F→ think of these exchange rates as the buying and selling prices of EUR or GBP.

Getting started VI

For instance, **$/ bid£ (€)** is the rate at which a certain mkt player is willing to buy GBP (EUR) against USD and **$/ ask£ (€)** is the rate at which the same mkt player sells GBP (EUR) against USD.

$/ bid£ (€) < $/ ask£ (€)

Terminology

Source: Bloomberg, 8th January 2015

BIG FIGURE

PIPS (1 pip= $\frac{1}{100}$ of a percentage point)

Bid-ask quotations I

Source: Bloomberg, 8th January 2015

- **$ 1.17725/bid€** means that the price provider is willing to buy EUR at 1.17725 USD;
- **$ 1.17755/ask€** means that the price provider is willing to sell EUR at 1.17755 USD

Bid-ask quotations II

Source: Bloomberg, 8th January 2015

- **¥ 119.805/bid$** means that the price provider is willing to buy USD at 119.805 JPY;
- **¥ 119.835/ask$** means that the price provider is willing to sell USD at 119.835 JPY

Bid-ask quotations III

Equivalent notations

$/bid£ = ask$/bid£ → rate at which the price provider is willing to buy GBP against (selling) USD (i.e. the buying rate for GBP and the selling rate for USD)

Bid-ask quotations IV

Equivalent notations

$/ask£ = bid$/ask£ → rate at which the price provider is willing to sell GBP against (buying) USD (i.e. the selling rate for GBP and the buying rate for USD)

Bid-ask quotations V

Given $/bid£ and $/ask£ , what if **you** were to sell/buy GBP?

- **$/bid£** = number of USD **you** will receive from the bank from the sale of GBP per USD

- **$/ask£** = the price that **you** must pay to buy GBP from USD

Reciprocal rates & bid-ask spread

When bid-ask prices are taken into account:

$$S_{i/askj} = \frac{1}{S_{j/bidi}}$$

and

$$S_{i/bidj} = \frac{1}{S_{j/aski}}$$

Evidence on the bid-ask spread

The **bid ask spread** tends to:

1. **vary throughout the day** →in particular, the spread is higher:
   - at the start/end of the trading day;
   - on Fridays (at closing), on Mondays (at opening) as well as on the last trading day of the month;
   - on market holidays (for big financial centers)
2. **increase** with the **volatility** of the spot rate
3. **decrease** when **more dealers** are in the market:
   - the larger the dealers, the thinner the spread

A practical insight I

Suppose you were to buy GBP from EUR and assume that:

S($/bid€)	S($/ask€)	S($/bid£)	S($/ask£)	S(£/bid€)	S(£/ask€)
1.102	1.105	1.5775	1.581	0.696	0.6965

In principle, you could **either** choose a **direct transaction** (you sell EUR to buy GBP) or an **indirect transaction** via USD (you first sell EUR to buy USD and then you sell USD to buy GBP)

A practical insight II

Indirect transaction:

S($/bid€)	S($/ask€)	S($/bid£)	S($/ask£)
1.102	1.105	1.5775	1.581

1. $S_{\$/bid€} = 1.1020$ (sell € to buy $)
2. $S_{\$/ask£} = 1.581$ (sell $ to buy £)
3. $S_{£/bid€} =$

$$\frac{S_{\$/bid€}}{S_{\$/ask£}} = \frac{1.1020}{1.581} = .6970$$

A practical insight III

Direct transaction:

S(£/bid€)	S(£/ask€)
0.696	0.6965

1. $S_{£/bid€} = $ .6960 (sell € to buy £)

Cross rates, arbitrages, B-A spread I

The best available solution is the one that allows you to get more GBP per EUR.

As long as $S_{£/bid\,€} \geq \dfrac{S_{\$/bid\,€}}{S_{\$/ask\,£}}$, you are better off choosing the direct transaction.

Cross rates, arbitrages, B-A spread II

Conversely, whenever $S_{£\,/\,bid\,€} \leq \dfrac{S_{\$\,/\,bid\,€}}{S_{\$\,/\,ask\,£}}$, the

indirect transaction will give you a better return.

Cross rates, arbitrages, B-A spread III

In practice, however, **triangular arbitrage opportunities** are very **unlikely to materialize**

An increasing number of people will try to profit from the price differential and will consequently sell €→buy $→sell $→buy £, thus driving € down and £ up, until equilibrium is finally restored (**No free lunch principle**)

$$S_{£/bid€} = \frac{S_{\$/bid€}}{S_{\$/ask£}}$$

To put it into practice I

	Bid	Ask
USD/Currency 1	1.35135	1.35227
Currency 2/USD	83.365	83.3925

1) How much would you lose if you converted $1000 into Currency1 and then back into USD?

2) What is the bid-ask spread for Currency 2/USD?

3) What is the bid-ask spread for Currency2/Currency1?

4) How much would you lose if you converted $1000 into Currency 1, then into Currency 2 and finally back into USD?

To put it into practice II

	BID	ASK
CZJ/GBP	42.7512	42.7983
DKK/GBP	11.3065	11.3235
EUR/GBP	1.2439	1.2501
NOK/GBP	12.3363	12.3479
DKK/EUR		
EUR/NOK		
GBP/CZJ		

1) Fill in the table above (please, **show <u>all</u> the relevant computations**).
2) Find the bid-ask spread for the EUR/CZJ quote.
3) How much would you lose if you converted 1500 DKK into GBP, then into EUR, further into NOK and finally back into DKK?

Forward foreign exchange market

Spot vs Forward markets

- *Spot exchange rate*: FX rate that is contracted today for immediate delivery (generally, t+1 or t+2)

- *Forward exchange rate*: rate that is contracted today for the exchange of currencies on a specific date in the future (1m, 3m, 6m…).

The forward market

Exactly **like** the **spot market**:

- No central location
- 24h trading
- *Direct interbank market* (decentralized, continuous, open-bid, double-auction) & *indirect broker market* (quasi-centralized, continuous, limit-book, single-auction market) [Lesson I]
- Bid-ask quotation

Conventions for fwd FX quotations I

Forward rates are generally quoted in terms of the corresponding **spot rate ±** a suitable number of **swap points**, depending on the forward maturity taken into consideration

Swap points will be added to (subtracted from) the spot bid-ask quotes whenever they are ascending (descending)

Conventions for fwd FX quotations II

Given the spot rates and the swap points below, how to find the corresponding fwd bid-ask quotation?

Spot	6-month swap
1.3965–70	27–23

Descending swap points → to be subtracted

F_{bid} = 1.3965-.0027 = 1.3938

and

F_{ask} = 1.3970-.0023 = 1.3947

Fwd FX quotations

The bid-ask spread for forward quotations is wider as time to maturity increases→ this is mostly due to market "**thinness**"

Thinness: smaller trading volumes for longer maturity forwards → it is more difficult for banks to offset positions in the interbank forward market after taking orders to buy or sell forwards

Fwd notation

Forward exchange rate: rate that is contracted today for the exchange of currencies on a specific date in the future.

$F_n(i/j)$ is the n-year forward exchange rate of currency i per unit of currency j

Forward premium and discount I

When it is necessary to pay more (less) for forward delivery than for spot delivery of a currency, we say that the currency is at a **forward premium (discount).**

Forward premium and discount II

N-year forward premium/discount

(on a yearly basis)

$$\frac{F_{ni/j} - S_{i/j}}{nS_{i/j}}$$

Forward premium and discount III

$S_{¥/\$} = 76.89$ and $F_{.5\ ¥/\$} = 76.65$

$$premium/discount = \frac{76.65 - 76.89}{.5 \cdot 76.89} = -.00624$$

Fwd discount of the Dollar versus the Yen ($\equiv$ fwd premium of the Yen versus the Dollar)

Fwd & expected future spot rates

Assuming **risk neutrality** and **no transaction costs**, forward rates must be equal to expected future spot rates (to prevent all arbitrage opportunities):

$$F_{ni/j}=E[S_{i/j}]$$

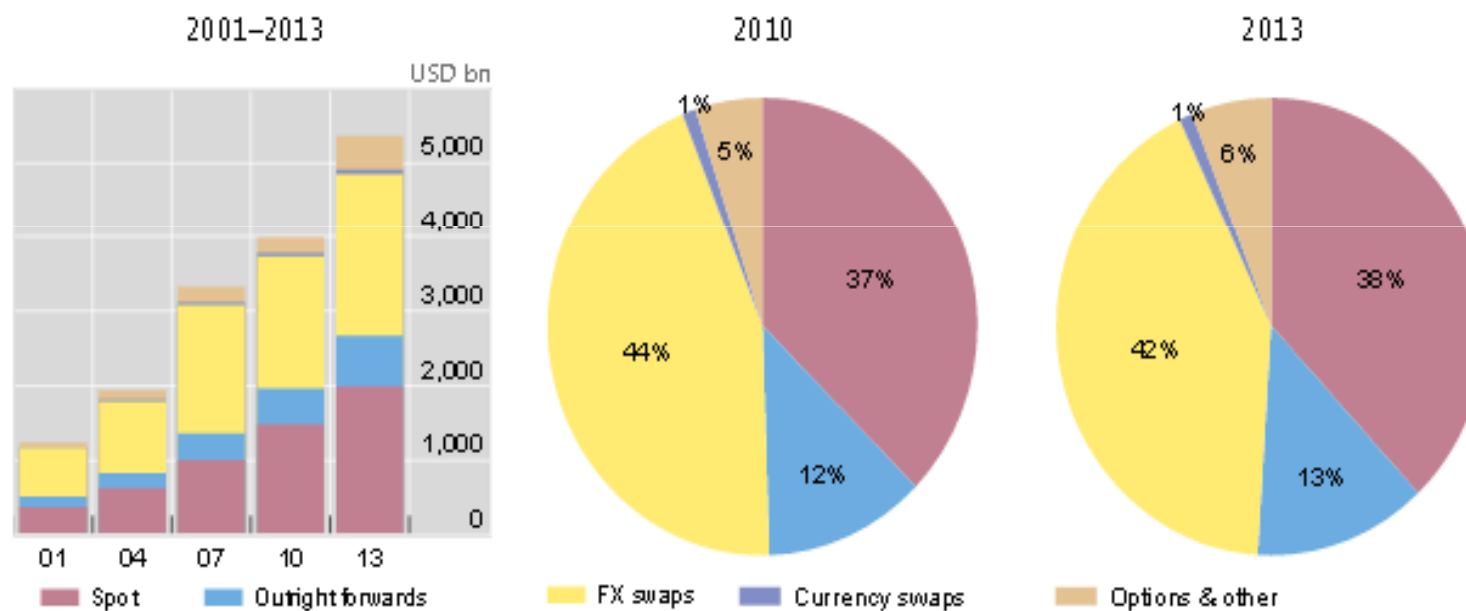Indeed, what would happen if

$$F_{ni/j} > (or <)E[S_{i/j}]?$$

FX net turnover by mkt segment

Foreign exchange market turnover by instrument[1]

Net-net basis, daily averages in April

Graph 3

2001–2013   2010   2013

Legend: Spot | Outright forwards | FX swaps | Currency swaps | Options & other

[1] Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis.

Source: BIS Triennial Central Bank Survey. For additional data by instrument, see Table 1 on page 9.

Terminology I

- **Outright fwd contract**: agreement to exchange currencies at a pre-determined price on a future date.

- **FX Swap**: agreement to buy and sell foreign exchange at pre-specified exchange rates, where the buying and selling are separated in time (two major components: a spot transaction plus a forward transaction in the reverse direction).

A **swap-in (swap-out)** € consists of an agreement to buy (sell) € spot and to sell (buy) them forward

Terminology II

- **Currency Swap**: agreement involving two parties in the exchange of principal and interest payments on a loan in one currency for principal and interest payments in another currency.

- **Options**: derivative contracts that give the buyer the opportunity to buy (call) or to sell (put) the underlying asset at a given price sometime in the future
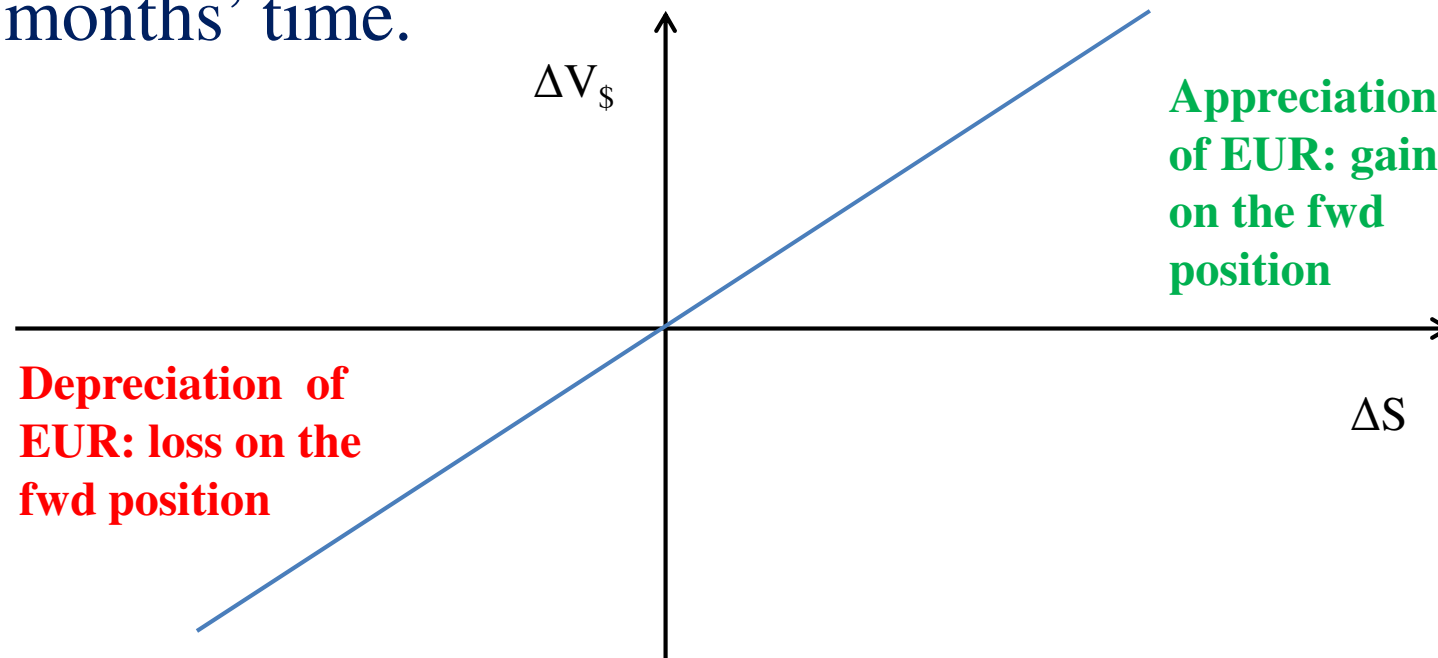
Forwards' payoff profile I

When the forward contract matures, its **value** is determined by the **realized spot rate** at that time.

Forwards' payoff profile II

Long forward position to buy 1 million € with $ in n-months' time.

$\Delta V_\$$

Appreciation of EUR: gain on the fwd position

ΔS

Depreciation of EUR: loss on the fwd position

$\mathbf{F_{\$/€}}=E[S_{\$/€}]$, $\mathbf{\Delta S}=$ (Realized $S_{\$/€}$- $F_{\$/€}$) and $\Delta V_\$=$ $ gain or loss on the forward position

Benefits and Risks of Forwards

- **High flexibility** (not only major currencies, tailor-made maturities, deliverable vs non-deliverable);

- **No central counterparty**→ higher settlement risk