About this document

The material in this document follows directly the handwritten lecture notes from the course in "Finance, Risk and Uncertainty" at UoE. The last 3 diagrams are my original work and are meant to illustrate what I found unclear at first.

Intro

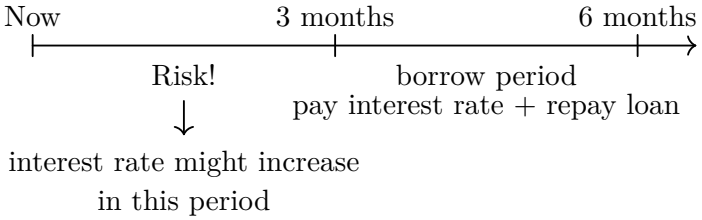
What can a corporate do about risk?

1. Do nothing (unhedge)
   Possible reasons include:
   - would be too expensive
   - high risk tolerance (e.g. high expected value)
   - risk is not *material* (significant)
   - they "think" the underlying assets will move in their favour (speculation)
2. Internal hedging
   Structure the bank/company so to internally remove risk.
3. Hedge, i.e. (partially) remove risk
   Gives *certainty* which aids planning. Some instruments are:

Forwards	**Futures**	**Options**
2 parties "Over the counter"	traded on Exchanges	give certainty + ability to benefit from favourable movements
custom contract	standardized contract	
limited liquidity	high liquidity can trade at any time	
Zero cost		**Non-zero** cost

Case

A UK company needs to borrow £100M for 3 months in 3 months.



Official interest rates

- These rates are
  - **inter-bank**, not for the public
  - **floating** / **variable**
  - given **per annum**, even those for 3 or 6 months
- **Risk** is that interest rates *increase*
- might either fall or increase in 3 months

Quoted in pairs[1]: $(0.65 - 0.55)$

Libor[2] *Borrow rate* | Libid[3] *Investment rate*

(see handout, page 12)

[1]Sometimes quoted in opposite order. The meaning is always such as to benefit the party giving the rates: it sells high and buys low.

[2]London Inter-Bank Offered Rate

[3]London Interbank Bid Rate

- Companies may *think* they will fall — this is a *speculation*.
  Thus they *think* they know better than what the market thinks (the rates in the market reflect what the market thinks).

Due to **higher risk of default**, the effective interest rate the UK company will pay actually is

$$\underset{\textit{(reference rate)}}{\text{base rate}} + \underset{\textit{(default rate)}}{\text{risk premium}},$$

i.e. has an extra due to the **borrower's riskiness**.

Hedge strategies

Assume the company wants *certainty* in the interest rate cost, i.e. a 100% hedge.

(it might think Libor is going to rise)

One choice would be a *fixed-rate loan*, but these are not often offered in real life.

Two ways to achieve this are *forwards* and *futures*. In the context of *interest rates*[4], these are called

$$\underset{\text{(Forward)}}{\text{Forward Rate Agreement (FRA)}} \quad \text{and} \quad \underset{\text{(Future)}}{\text{Interest Rate Future (IRF)}}$$

We now look at both.

Forward Rate Agreements

- An agreement on the future rate (Libor)
- Signed with another party, usually an intermediate
  Not necessarily the loan issuer!
- Firm and binding
  Cannot change your mind if odds are not in your favour!
- A **gamble on its own**, a speculation.
  There's a *winner* and a *loser*.

FRA Dealer
Offers sample

3 v 6	0.6% — 0.5%
6 v 9	0.74% — 0.62%
9 v 12	0.8% — 0.7%

Combined, though, (FRA + borrow) is **a hedge**: the gain/loss of the borrowing is offset by the loss/gain of the FRA. See Figure 1 for how that works in our case with a FRA rate of 0.6% in two scenarios: rates falling to 0.5% and rising to 1% at point of payment.

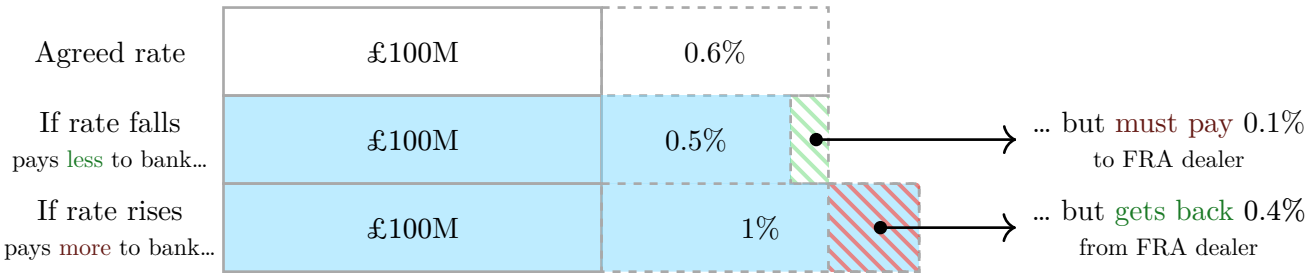


Figure 1: FRA as a hedge mechanism

In both cases, the UK company pays the loan back at the market rate — 0.5% or 1% (plus risk premium), blued out, the net cash flow is 0.6% fixed in the FRA.

The setup of the hedge is spelled out fully as

[4] and not e.g. in the context of currency

Forward Rate Agreement setup	
Buy or Sell	**Buy** (see below)
Amount	**£100M** due to 100% hedging policy
Rate	**0.6%**
Time period	**3 versus 6** *start month* v *end month*

See Figure 2 for the cash flows spelled explicitly in the two cases: when the actual rate falls to 0.5% and rises to 1%, the agreed one being 0.6%:

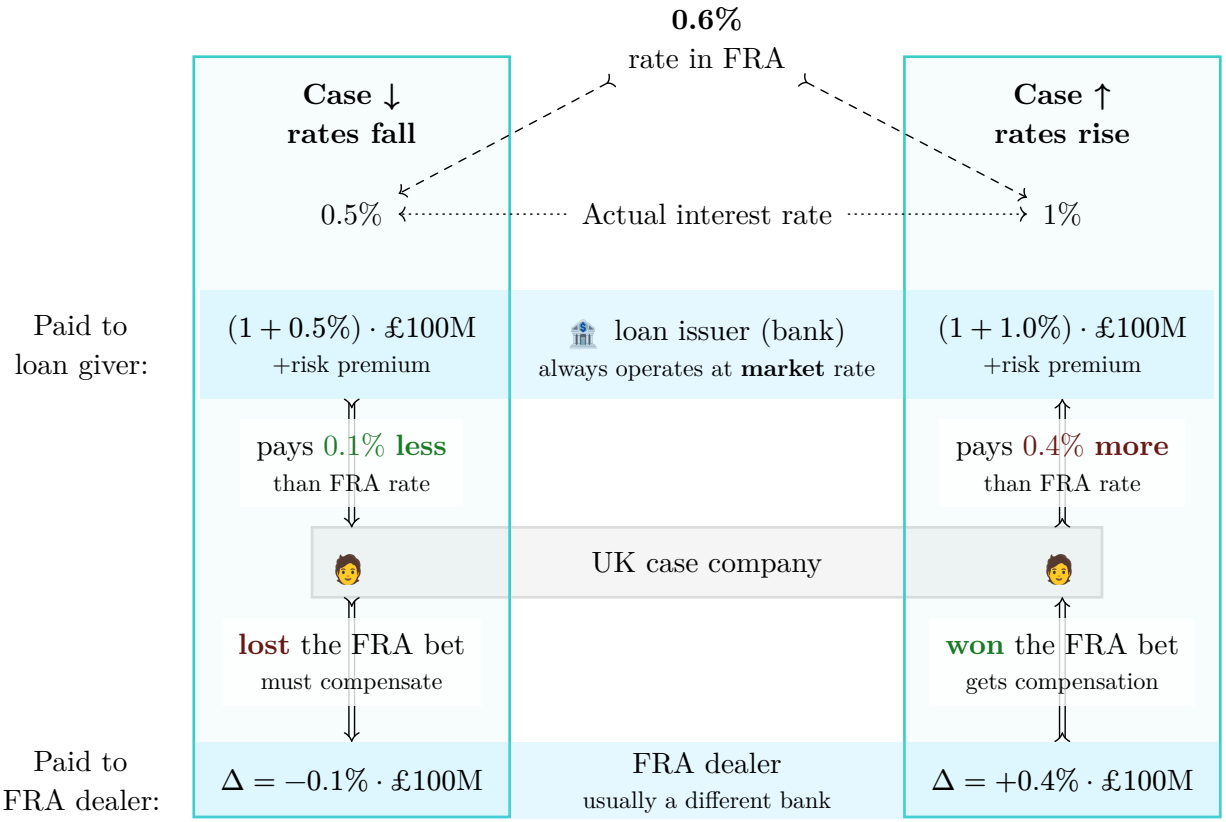


Figure 2: FRA cash flows from (UK company) borrower's point of view

The party compensated for **Rise / Fall** of interest rates is said to **Buy / Sell** the FRA contract, usually a **Borrower / Investor**.

Interest Rate Futures

Same principle as FRAs.

Traded on exchanges, contracts with standardized

- time period
  fixed start month and length
- contract size
  notional amount covered by the contract
- rates
  - shown value is (100 − rate) instead, and is colloquially called "price"[5]

Interest rates futures sample 2004			
	Start	Open	Sett
Sterling 3m	Mar	99.44	99.44
Sterling 3m	Jun	99.43	99.43
Sterling 3m	Nov	99.42	99.41

Contract size: £500 000
Spread: 2.8%

(see handout, page 14)

- usually shown is the *average* between buy/sell
  have to take the *spread* into account

Assume the example case is set in January, so the £100M borrow lasts Mar-Jun. For the UK case company we are interested in the *Sterling 3m March* future, column Sett.

With a quoted price of 99.4 and spread 2.8, the meaning of the prices is as follows:

At the price	99.3	99.58
Exchange is said to	**buy** (cheap)	**sell** (expensive)
The exchange compensates	**fall** of IRF price	**rise** of IRF price
	rise in interest rates	**fall** in interest rates

Hedge setup

Interest Rate Futures

Buy or sell	**Sell**
Amount	**200 contracts**
Length	**3 months**
Start	**March**
Price	**99.3**

Thus the case UK company that seeks compensations for **rising** rates needs to **sell** futures to the exchange and will use the *lower* price, **99.3**.

The future's contract size in £500k, so 100% hedging is achieved by buying

$$\frac{\text{£100M}}{\text{£500k}} = 200 \text{ contracts.}$$

Note: If the available periods or amounts do not fit, we have to split/partition.

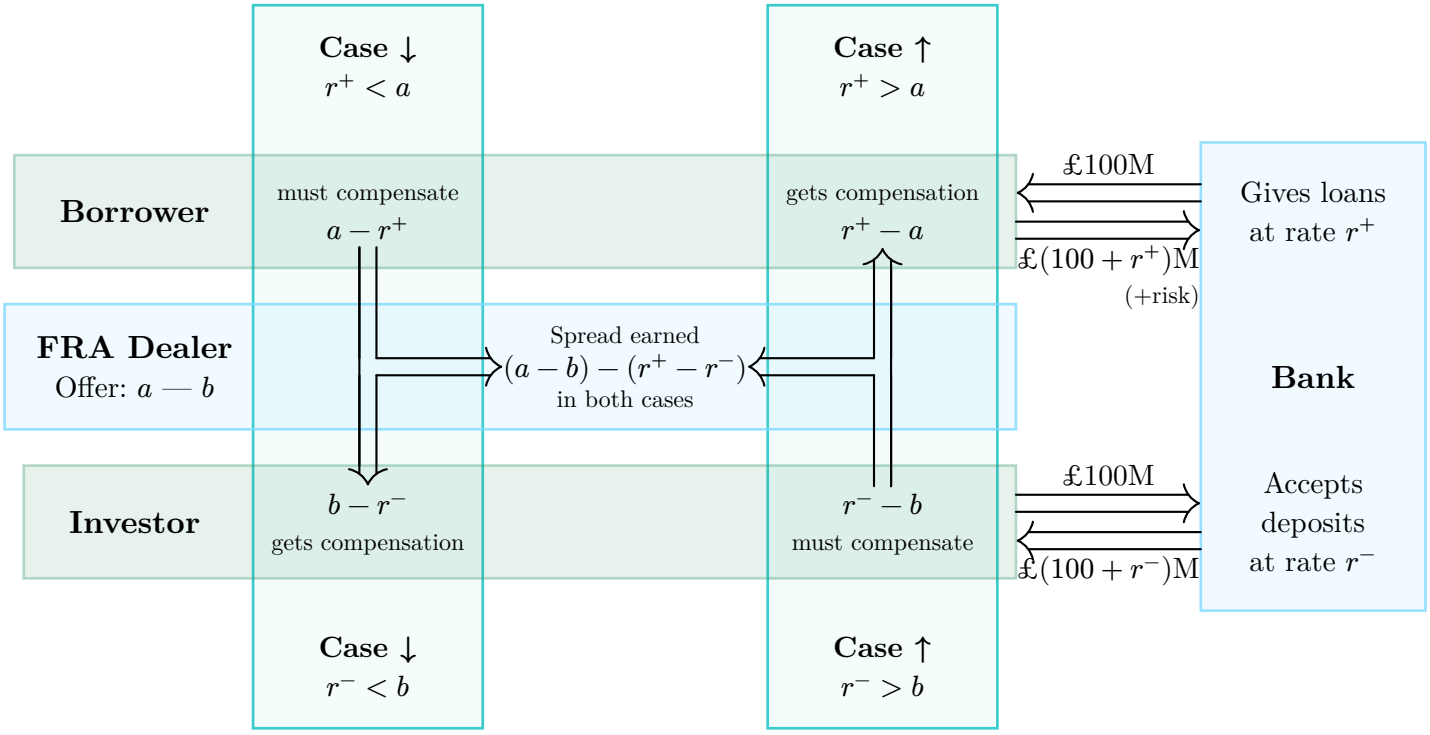


Figure 3: FRA all players and cash flows

[5] though no such amount of money is actually exchanged. Thus the "price" term here is more like a figure of speech.