# 20

# Interest rate risk

| Topic list | Syllabus reference |
|---|---|
| 1 Interest rates | H1 (b) |
| 2 Interest rate risk | H1 (b) |
| 3 The causes of interest rate fluctuations | H2 (c) |
| 4 Interest rate risk management | H4 (a) |
| 5 Interest rate derivatives | H4 (b) |

## Introduction

Here we consider **interest rate risk** and some of the financial instruments which are now available for managing financial risks, including **derivatives** such as **options.** The risk of interest rate changes is however less significant in most cases than the risk of currency fluctuations which, in some circumstances, can fairly easily wipe out profits entirely if it is not hedged.

# Study guide

| | | Intellectual level |
|---|---|---|
| **H1** | **The nature and types of risk and approaches to risk management** | |
| (b) | Describe and discuss different types of interest rate risk: | 1 |
| (i) | Gap exposure | |
| (ii) | Basis risk | |
| **H2** | **Causes of interest rate fluctuations** | |
| (c) | Describe the causes of interest rate fluctuations, including: | 2 |
| (i) | Structure of interest rates and yield curves | |
| (ii) | Expectations theory | |
| (iii) | Liquidity preference theory | |
| (iv) | Market segmentation | |
| **H4** | **Hedging techniques for interest rate risk** | |
| (a) | Discuss and apply traditional and basic methods of interest rate risk management, including: | |
| (i) | Matching and smoothing | 1 |
| (ii) | Asset and liability management | 1 |
| (iii) | Forward rate agreements | 2 |
| (b) | Identify the main types of interest rate derivatives used to hedge interest rate risk and explain how they are used in hedging. | 1 |

# Exam guide

The material in this chapter will be examined almost entirely as a discussion question and it is important you understand and can explain the terminology.

# 1 Interest rates

FAST FORWARD

The **pattern of interest rates** on financial assets is influenced by the **risk** of the assets, the **duration** of the lending, and the **size** of the loan.

There is a **trade-off** between **risk and return**. Investors in riskier assets expect to be compensated for the risk

**Interest rates** are effectively the 'prices' governing lending and borrowing. We discussed the pattern of interest rates in Section 4 of Chapter 3.

# 2 Interest rate risk

FAST FORWARD

**Interest rate risk** is faced by companies with floating and fixed rate debt. It can arise from **gap exposure** and **basis risk.**

Interest rate risk relates to the sensitivity of profit and cash flows to changes in interest rates. An organisation will need to analyse how profits and cash flows are likely to be affected by forecast changes in interest rates and decide whether to take action.

## 2.1 Floating interest rate debt

The most common form of interest rate risk faced by a company is the **volatility of cash flows** associated with a high proportion of **floating** interest rate debt. Floating interest rates, of course, change according to general market conditions.

Some of the interest rate risks to which a firm is exposed may **cancel each other out**, where there are both assets and liabilities with which there is exposure to interest rate changes. If interest rates rise, more interest will be payable on loans and other liabilities, but this will be **compensated for** by higher interest received on assets such as money market deposits.

## 2.2 Fixed interest rate debt

A company with a high proportion of fixed interest rate debt has a commitment to fixed interest payments. If interest rates fall sharply, the company will suffer from a loss of **competitive advantage** compared with companies using floating rate borrowing whose interest costs and cost of capital will fall.

## 2.3 Gap exposure

The degree to which a firm is exposed to interest rate risk can be identified by using the method of **gap analysis**. Gap analysis is based on the principle of **grouping together** assets and liabilities which are sensitive to interest rate changes according to their maturity dates. Two different types of 'gap' may occur.

(a) **A negative gap**

A negative gap occurs when a firm has a larger amount of interest-sensitive liabilities maturing at a certain time or in a certain period than it has interest-sensitive assets maturing at the same time. The difference between the two amounts indicates the net exposure.

(b) **A positive gap**

There is a positive gap if the amount of interest-sensitive assets maturing in a particular time exceeds the amount of interest-sensitive liabilities maturing at the same time.

With a **negative** gap, the company faces exposure if interest rates **rise** by the time of maturity. With a **positive** gap, the company will lose out if interest rates **fall** by maturity.

## 2.4 Basis risk

It may appear that a company which has size-matched assets and liabilities, and is both receiving and paying interest, may not have any interest rate exposure. However, the two floating rates may not be determined using the same **basis.** For example, one may be linked to LIBOR but the other is not.

**Key term**

**LIBOR** or the London Inter-Bank Offered Rate is the rate of interest applying to wholesale money market lending between London banks.

This makes it unlikely that the two floating rates will move perfectly **in line** with each other. As one rate increases, the other rate might change by a different amount or might change later.

# 3 The causes of interest rate fluctuations

**FAST FORWARD**

The **causes** of interest rate fluctuations include the **structure of interest rates and yield curves** and **changing economic factors**.

## 3.1 The structure of interest rates

There are several reasons why interest rates differ in different markets and market segments.

(a) **Risk**

Higher risk borrowers must pay higher rates on their borrowing, to compensate lenders for the greater risk involved.

(b) **The need to make a profit on re-lending**

Financial intermediaries make their profits from re-lending at a higher rate of interest than the cost of their borrowing.

(c) **The size of the loan**

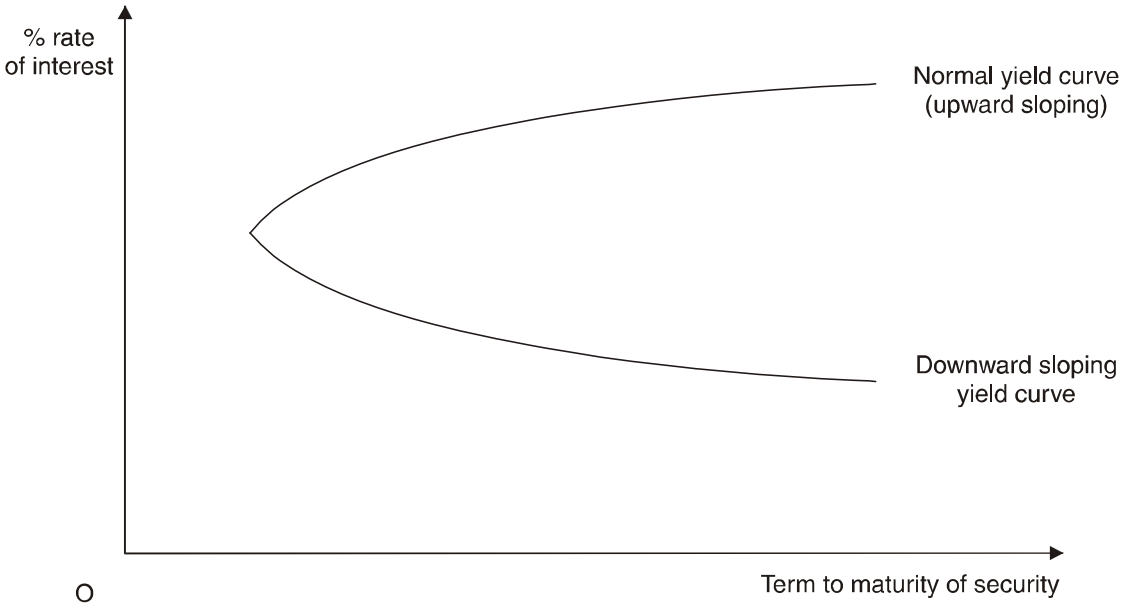
Deposits above a certain amount with a bank or building society might attract higher rates of interest than smaller deposits.

(d) **Different types of financial asset**

Different types of financial asset attract different rates of interest. This is largely because of the competition for deposits between different types of financial institution.

(e) **The duration of the lending**

The **term structure of interest rates** refers to the way in which the yield on a security varies according to the term of the borrowing, that is the length of time until the debt will be repaid as shown by the **yield curve**. Normally, the longer the term of an asset to maturity, the higher the rate of interest paid on the asset.




**Liquidity preference theory** tells us the reasons why, in theory, the yield curve will normally be upward sloping, so that long-term financial assets offer a higher yield than short-term assets.

Liquidity preference means investors prefer cash now to later and want **compensation** in the form of a **higher return** for being unable to use their cash now. Long-term interest rates therefore not only reflect investors' assumptions about future interest rates but also include a premium for holding long-term bonds. This premium compensates investors for the added **risk** of having their money tied up for a longer period, including the greater price uncertainty. Because of this premium, long-term bond yields tend to be higher than short-term yields, and the yield curve slopes upward.

(f) **Expectations theory** states that the forward interest rate is due only to expectations of interest rate movements. When interest rates are expected to fall, short-term rates might be higher than long-term rates, and the yield curve would be downward sloping. Thus, the shape of the yield curve gives an indication to the financial manager about how interest rates are expected to move in the future.

(g) The **market segmentation theory** of interest rates suggests that the slope of the yield curve will reflect conditions in different segments of the market. This theory holds that the major investors are confined to a particular segment of the market and will not switch segment even if the forecast of likely future interests rates changes.

(h) **Government policy** on interest rates might be significant too. A policy of keeping interest rates relatively high might therefore have the effect of forcing short-term interest rates higher than long-term rates.

## 3.2 The general level of interest rates

Interest rates on any one type of financial asset will vary over time. In other words, the general level of interest rates might go up or down. The general level of interest rates is affected by several factors.

(a) **Need for a real return**

Investors normally want to **earn a 'real' rate of return** on their investment. The appropriate 'real' rate of return will depend on factors such as investment risk.

(b) **Inflation**

Nominal rates of interest should be sufficient to **cover expected rates of inflation** over the term of the investment and to provide a real return.

(c) **Uncertainty about future rates of inflation**

When investors are uncertain about inflation and therefore about what future nominal and real interest rates will be, they are likely to require **higher interest yields** to persuade them to take the risk of investing, especially in the longer term.

(d) **Liquidity preference of investors and the demand for borrowing**

**Higher interest rates** have to be offered to persuade savers to invest their surplus money. When the demand to borrow increases, interest rates will rise.

(e) **Balance of payments**

When a country has a continuing deficit on the current account of its balance of payments, and the authorities are unwilling to allow the exchange rate to depreciate by more than a certain amount, interest rates may have to be raised to **attract capital** into the country. The country can then finance the deficit by borrowing from abroad.

(f) **Monetary policy**

From mid-1997, decisions over UK interest rate policy have been made by the Monetary Policy Committee of the Bank of England. The Bank of England influences very short-term money market rates by means of op**en market operations**. Usually longer term money market rates, and then banks' base rates, will respond to the authorities' wish for interest rate changes.

(g) **Interest rates abroad**

The rate of interest in one country will be influenced by **external factors**, such as interest rates in other countries and expectations about the exchange rate. When interest rates in overseas countries are high, interest rates on domestic currency investments must also be comparably high, to avoid capital transfers abroad and a fall in the exchange rate of the domestic currency.

# 4 Interest rate risk management 12/08

FAST FORWARD

Interest rate risk can be managed using **internal hedging** in the form of asset and liability management, matching and smoothing or using **external hedging** instruments such as forward rate agreements and derivatives.

## 4.1 Matching and smoothing

Matching and smoothing are two methods of **internal hedging** used to manage interest rate risk.

Key term

**Matching** is where liabilities and assets with a common interest rate are matched.

For example subsidiary A of a company might be investing in the money markets at LIBOR and subsidiary B is borrowing through the same market at LIBOR. If LIBOR increases, subsidiary A's borrowing cost increases and subsidiary B's returns increase. The **interest rates** on the assets and liabilities are therefore **matched**.

This method is most widely used by financial institutions such as banks, who find it easier to match the magnitudes and characteristics of their assets and liabilities than commercial or industrial companies.

Key term

**Smoothing** is where a company keeps a **balance** between its fixed rate and floating rate borrowing.

A rise in interest rates will make the floating rate loan more expensive but this will be **compensated** for by the less expensive fixed rate loan. The company may however incur increased transaction and arrangement costs.

## 4.2 Forward rate agreements (FRAs)

FAST FORWARD

**Forward rate agreements** hedge risk by **fixing the interest rate** on future borrowing.

A company can enter into a FRA with a bank that **fixes the rate of interest** for borrowing at a certain time in the future. If the actual interest rate proves to be higher than the rate agreed, the bank pays the company the difference. If the actual interest rate is lower than the rate agreed, the company pays the bank the difference. The FRA does not need to be with the same bank as the loan as the FRA is a hedging method independent of any loan agreement.

One **limitation** of FRAs is that they are usually only available on loans of at least £500,000. They are also likely to be **difficult to obtain for periods of over one year**.

An **advantage** of FRAs is that, for the period of the FRA at least, they **protect the borrower** from adverse market interest rate movements to levels above the rate negotiated for the FRA. With a normal variable rate loan (for example linked to a bank's base rate or to LIBOR) the borrower is exposed to the risk of such adverse market movements. On the other hand, the borrower will similarly not benefit from the effects of favourable market interest rate movements.

The **interest rates** which banks will be willing to set for FRAs will reflect their current expectations of interest rate movements. If it is expected that interest rates are going to rise during the term for which the FRA is being negotiated, the bank is likely to seek a higher fixed rate of interest than the variable rate of interest which is current at the time of negotiating the FRA.

### 4.2.1 FRA terminology

The terminology is as follows:

(a) 5.75-5.70 means that you can fix a borrowing rate at 5.75%.
(b) A '3-6' forward rate agreement is one that starts in three months and lasts for three months.
(c) A basis point is 0.01%.

### 4.2.2 Example: Forward rate agreement

It is 30 June. Lynn plc will need a £10 million 6 month fixed rate loan from 1 October. Lynn wants to hedge using an FRA. The relevant FRA rate is 6% on 30 June.

(a) State what FRA is required.
(b) What is the result of the FRA and the effective loan rate if the 6 month FRA benchmark rate has moved to
    (i) 5%
    (ii) 9%

## Solution

(a) The Forward Rate Agreement required is '3-9'.

(b) (i) At 5% because interest rates have fallen, Lynn plc will make a payment to the bank.

| | £ |
|---|---|
| FRA payment £10 million × (6% – 5%) × $^{6}/_{12}$ | (50,000) |
| Payment on underlying loan 5% × £10 million × $^{6}/_{12}$ | (250,000) |
| Net payment on loan | (300,000) |
| Effective interest rate on loan | 6% |

(ii) At 9% because interest rates have risen, the bank will make a payment to Lynn plc.

| | £ |
|---|---|
| FRA receipt £10 million × (9% – 6%) × $^{6}/_{12}$ | 150,000 |
| Payment on underlying loan at market rate 9% × £10 million × $^{6}/_{12}$ | (450,000) |
| Net payment on loan | (300,000) |
| Effective interest rate on loan | 6% |

Note that the FRA and loan need not be with the same bank.

# 5 Interest rate derivatives

FAST FORWARD

**Interest rate futures** can be used to hedge against interest rate changes between the current date and the date at which the interest rate on the lending or borrowing is set. Borrowers **sell futures** to hedge against **interest rate rises;** lenders **buy futures** to hedge against **interest rate falls.**

## 5.1 Futures contracts

Most LIFFE (London International Financial Futures and Options Exchange) futures contracts involve interest rates (**interest rate futures**), and these offer a means of hedging against the risk of interest rate movements. Such contracts are effectively a gamble on whether interest rates will rise or fall. Like other futures contracts, interest rate futures offer a way in which **speculators can 'bet'** on market movements just as they offer others who are more risk-averse a way of **hedging risks.**

Interest rate futures are similar in effect to FRAs, except that the terms, amounts and periods are **standardised**. For example, a company can contract to buy (or sell) £100,000 of a notional 30-year Treasury bond bearing an 8% coupon, in say, 6 months time, at an agreed price. The basic principles behind such a decision are:

(a) The futures price is likely to vary with changes in interest rates, and this acts as a **hedge** against adverse interest rate movements.

(b) The outlay to buy futures is much less than for buying the financial instrument itself, and so a company can hedge large exposures of cash with a relatively **small initial employment of cash.**

### 5.1.1 Nature of contracts

The **standardised nature** of interest rate futures is a limitation on their use by the corporate treasurer as a means of hedging, because they **cannot always be matched** with specific interest rate exposures. However, their use is growing. Futures contracts are frequently used by banks and other financial institutions as a means of hedging their portfolios: such institutions are often not concerned with achieving an exact match with their underlying exposure.

### 5.1.2 Entitlement with contracts

With interest rate futures what we **buy** is the entitlement to **interest receipts** and what we **sell** is the promise to make **interest payments**. So when a lender buys one 3-month sterling contract he has the right to receive interest for three months in pounds. When a borrower sells a 3-month sterling contract he incurs an obligation to make interest payments for three months.

(a) **Borrowers** will wish to hedge against an interest rate rise by **selling futures now** and **buying futures** on the day that the interest rate is fixed.

(b) **Lenders** will wish to hedge against the possibility of falling interest rates by **buying futures now** and **selling futures** on the date that the actual lending starts.

### 5.1.3 Other factors to consider

(a) **Short-term interest rate futures** contracts normally represent interest receivable or payable on notional lending or borrowing **for a three month period** beginning on a standard future date. The contract size depends on the currency in which the lending or borrowing takes place. For example, the 3-month sterling interest rate futures March contract represents the interest on notional lending or borrowing of £500,000 for three months, starting at the end of March. £500,000 is the contract size.

(b) As with all futures, a **whole number of contracts** must be dealt with. Note that the notional **period of lending or borrowing starts** when the **contract expires**, at the **end of March**.

(c) On LIFFE, futures contracts are available with **maturity dates** at the end of March, June, September and December. The 3-month eurodollar interest rate futures contract is for notional lending or borrowing in US dollars. The contract size is $1 million.

## 5.2 Interest rate options

FAST FORWARD

**Interest rate options** allow an organisation to limit its exposure to adverse interest rate movements, while allowing it to take advantage of favourable interest rate movements.

Key term

An **interest rate option** grants the buyer of it the right, but **not the obligation**, to deal at an agreed interest rate (strike rate) at a future maturity date. On the date of expiry of the option, the buyer must decide whether or not to exercise the right.

Clearly, a buyer of an **option to borrow** will **not wish to exercise** it if the **market interest rate** is now **below** that specified in the option agreement. Conversely, an **option to lend** will not be worth exercising if **market rates** have **risen above** the rate specified in the option by the time the option has expired.

Tailor-made **'over-the-counter' interest rate options** can be purchased from major banks, with specific values, periods of maturity, denominated currencies and rates of agreed interest. The cost of the option is the 'premium'. Interest rate options offer more **flexibility** than and are more **expensive** than FRAs.

## 5.3 Interest rate caps, collars and floors

FAST FORWARD

**Caps** set a ceiling to the interest rate; a **floor** sets a lower limit. A **collar** is the simultaneous purchase of a cap and sale of floor.

Various **cap** and **collar** agreements are possible.

Key term

(a) An interest rate **cap** is an option which sets an interest rate ceiling.

(b) A **floor** is an option which sets a lower limit to interest rates.

(c) Using a **'collar'** arrangement, the borrower can buy an interest rate cap and at the same time sell an interest rate floor. This limits the cost for the company as it receives a premium for the option it's sold.

The cost of a collar is lower than for buying an option alone. However, the borrowing company forgoes the benefit of movements in interest rates **below the floor limit** in exchange for this cost reduction and an investing company forgoes the benefit of **movements in interest rates above the cap level**. A **zero cost collar** can even be negotiated sometimes, if the **premium paid** for buying the cap **equals** the **premium received** for selling the floor.

## 5.4 Interest rate swaps

FAST FORWARD

**Interest rate swaps** are where two parties agree to exchange interest rate payments.

Interest rate swaps can act as a means of **switching** from paying one type of interest to another, raising **less expensive loans** and **securing better** deposit **rates**.

A **fixed to floating rate currency swap** is a combination of a currency and interest rate swap.

Key term

**Interest rate swap** is an agreement whereby the parties to the agreement exchange interest rate commitments.

### 5.4.1 Swap procedures

**Interest rate swaps** involve two parties agreeing to exchange interest payments with each other over an agreed period. In practice, however, the major players in the swaps market are banks and many other types of institution can become involved, for example national and local governments and international institutions.

In the simplest form of interest rate swap, party A agrees to pay the interest on party B's loan, while party B reciprocates by paying the interest on A's loan. If the swap is to make sense, **the two parties must swap interest which has different characteristics**. Assuming that the interest swapped is in the same currency, the most common motivation for the swap is to switch from paying floating rate interest to fixed interest or *vice versa*. This type of swap is known as a **'plain vanilla'** or **generic** swap.

### 5.4.2 Why bother to swap?

Obvious questions to ask are:

- Why do the companies bother swapping interest payments with each other?
- Why don't they just terminate their original loan and take out a new one?

The answer is that **transaction costs** may be too high. Terminating an original loan early may involve a significant termination fee and taking out a new loan will involve issue costs. Arranging a swap can be significantly cheaper, even if a banker is used as an intermediary. Because the banker is simply acting as an agent on the swap arrangement and has to bear no default risk, the arrangement fee can be kept low.

Exam focus point

If you have to discuss which instrument should be used to hedge interest rate risk, consider **cost**, **flexibility**, **expectations** and **ability to benefit** from favourable interest rate movements.